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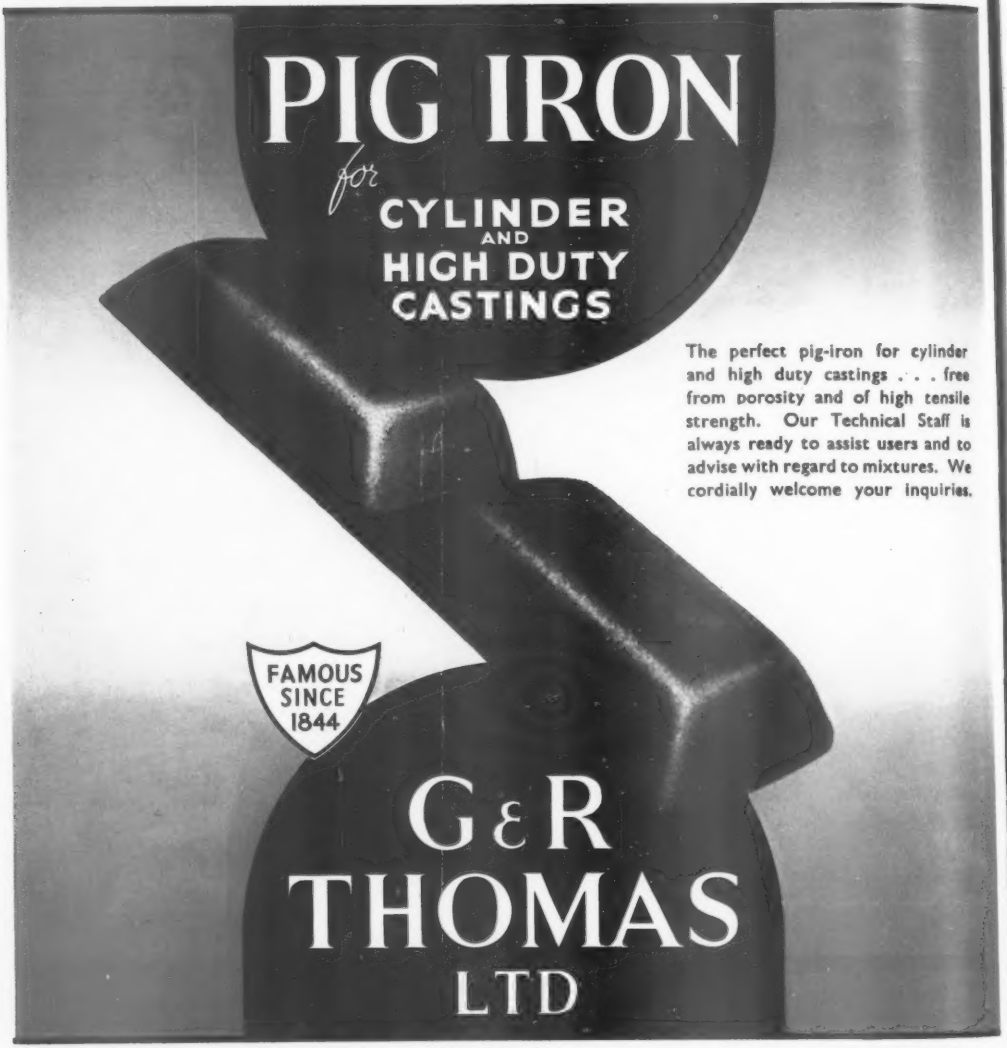

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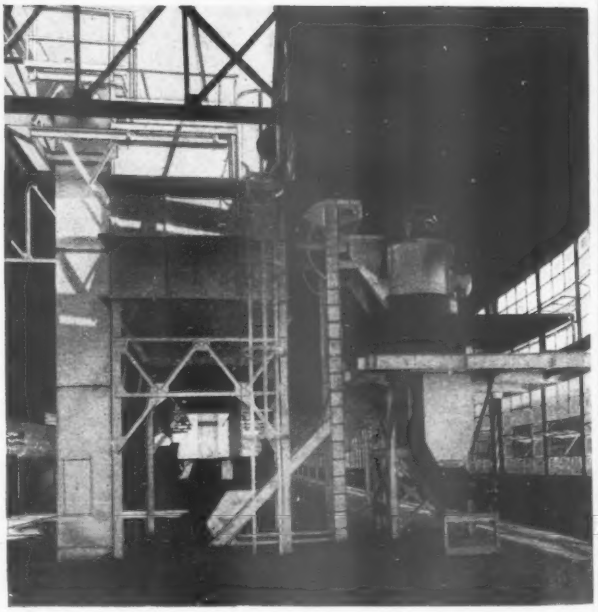

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FOUNDRY
TRADE JOURNAL

Vol. 104 MARCH 13, 1958 No. 2161

Back in '54

Though statistics of four years ago are industrially useless, one can get a certain amount of amusement trying to analyse them. In the first place, it should be realized that the Census of Production for Iron Foundries* covered, in that year, 1,050 concerns, of which 212 employed an average of 10 or fewer persons. This would omit about a third of the foundries. In table 1, "Estimates for the Industry as a Whole," can be taken as meaning those covered by the survey. It says that the gross output from production was worth £153.8 millions. Table 2, "Summary of Returns Received," states that in the larger than 10 employee concerns this value of sales and work done was £150,226,000; making a subtraction, that leaves £3.6 millions as the value of the output of the little concerns or £17,000 per firm using on an average 6.5 people, a figure which we do not credit, as the value per man employed would be only £13 as against £756 for the larger concerns.

The figures disclosed relate to 1948, 1951 and 1954, and the output of iron castings for those years were 3,283,900, 3,752,527 and 3,742,000 tons. Here the census of production value is in reasonable agreement but referring particularly to the 1951 and 1954 figures, virtually similar outputs were obtained with 119,193 and 89,263 people respectively. The total weight of iron castings given in the Report is 2,325,100 tons as against 3,742,000 tons actually produced.

Table 9 presents quite a few points of interest as it discloses for the larger concerns the purchase of materials and fuel. According to the returns in 1954, iron foundries spent £66,000,000 on supplies; over £6 millions went on fuel; £26 millions on pig-iron, and £7 millions on scrap. Nearly a million went on core-oils and the like, but £2,300,000 on spare parts. There are two figures given for the purchase of moulding boxes, apparently to avoid disclosing commercial information, but they total up to over a third of a million. The cost of grinding wheels, and this of course for the iron foundries only, totals up to £290,000. Whilst nearly £1 million was paid for moulding sand, this figure was eclipsed by the amount paid for brass and other copper alloy (including nickel silver and cupro-nickel, but excluding all other nickel alloys) as these cost £1.3 millions. Again, the ironfounders spent more than a million on alloys, a figure arrived at by including over half a million pounds worth of aluminium; half a million went on refractories. It would appear from some of the figures quoted that quite a few of these iron foundries undertake non-ferrous work. The Report opens with the following remark:—"Owing to the increasing proportion of gas appliances made from sheet steel instead of from cast iron, a number of establishments classified to this industry for 1948 and 1951 were re-classified for 1954 to the hardware, hollow-ware, metal furniture and sheet-metal industries in 1954. In 1951, these establishments employed 9,024 persons and had a net output of £6,291,000."

* Report on the Census of Production for 1954, Vol. 3, Industry C, Iron Foundries. Obtainable from H.M. Stationery Office; price 1s. 9d. net.

CORRESPONDENCE

SWELLING OF WOOD PATTERNS

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—I read with interest the article in the JOURNAL of February 13 entitled "Swelling of Wood Patterns." My experience, however, has shown that *loss* in dimension of timber and patterns causes most trouble to the patternmaker and foundryman. The pattern and corebox illustrated in the article clearly showed the pattern construction to be at fault and the engineering-shop superintendent had good cause to complain, in my opinion.

On the attached sheet I have roughly sketched the method of pattern construction I or any average patternmaker would use to construct this pattern whether it be for one off or a quantity. However, in making these remarks I do not wish to detract from an otherwise objective article.—Yours, etc.,

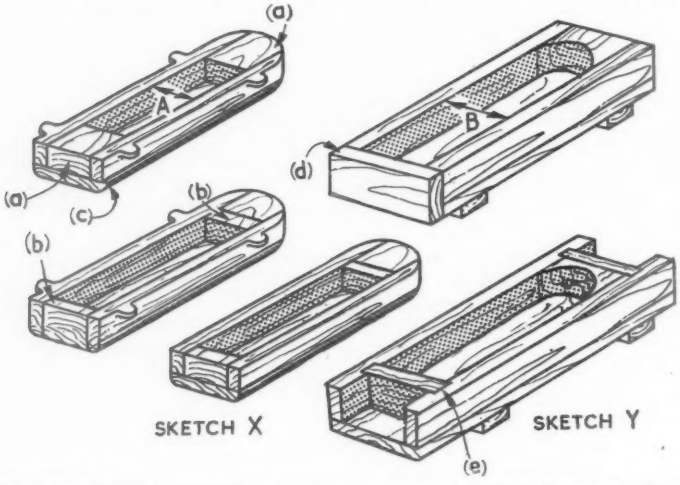
G. EVANS.

Patternmaker,

99b, Persehouse Street, Walsall, Staffs.

February 17, 1958.

FIG. 1.—*In the upper sketches are repeated the pattern and corebox design of the original article, while below are indicated the modifications put forward by the correspondent.*



In the original design, shrinkage or expansion at the dimension, A, is uncontrolled; the centre-piece (*a*), it is contended, should be reduced in size as shown at (*b*) so as to present a minimum amount of end grain of timber to absorb moisture. Similarly, at (*c*) and (*d*) poor construction is alleged by the overcarrying of top and end boards respectively. Sketch X, of the underside of the pattern, indicates how the top-board may be enclosed to permit freedom to shrink or expand, and sketch Y illustrates at (*e*) how the use of a butt-jointed or housed end-timber in the corebox can be arranged according to the number of cores required from the box.

Working Days lost in January

Industrial disputes cost 107,000 working days during January, compared with 42,000 in December and 124,000 in January, 1957. Of the 107,000, coal mining accounted for 44,000 working days and the vehicle industry for 27,000. About 62,600 workers were involved.

A rise of about £99,000 a week in the total national wage bill took place in January, about two-thirds of this being due to the operation of automatic cost-of-living sliding scales. The wage index remains unaffected and, compared with January, 1956, it is 12 per cent. up.

National Society of Master Patternmakers

The National Society of Master Patternmakers will be holding their annual dinner/dance in the Burleigh Suite of the Strand Palace Hotel, London, W.C.2, on Friday, May 2 (reception 6.30 for 7.15 p.m.). The principal guest will be Mr. B. Macarty, director of the Engineering & Allied Employers National Federation. Seating accommodation is somewhat limited so those wishing to attend should make early application for tickets—price £2 10s. each—to the secretaries, Fisher & Firkins, at 12, Cherry Street, Birmingham.

Dinner

AGA HEAT, LIMITED

The annual dinner of Aga Heat, Limited (held in connection with the conference of the firm's agents) took place last Wednesday at the Dorchester Hotel, London, W.1, Mr. V. Jobson presiding. The speakers on the toast list were Mr. J. P. Mollett (Bradford); Mr. Charles Insch; Mr. D. G. G. Edwards (Liverpool); Mr. W. T. Wren and Mr. J. Latham, C.B.E. After dinner the guests were entertained by the amazing Fogel and Miss Peggy Wilding.

Index to Vol. 103

The index to the JOURNAL, volume 103, covering the period July to December, 1957, has now been printed and is available to readers free of charge. Applications for copies should be addressed to the publishing office, FOUNDRY TRADE JOURNAL, John Adam House, John Adam Street, Adelphi, London, W.C.2. Subscribers who wish to receive copies of indices automatically as they are printed may apply for inclusion on a permanent mailing list. Those already on this list should not need to apply for their current copy.

Factors affecting Carbon Pick-up in the Cupola*

By Michael Perch and Charles C. Russell

The Authors describe tests which they carried out in order to assess the carbon-solubility characteristics in iron of a number of foundry cokes. An account is given of the procedure employed and the carbon pick-up behaviour of the various cokes tested is briefly presented. The practical value of such tests is self-evident in view of the fact that the founders making high-duty iron are, in the main, dependent upon coke as a source of carbon. The variability of different cokes in this respect and the factors determining the carbon content in the cupola melt are examined in some detail.

Preliminary Comment

In the foundry-cupola melting process the foundryman is dependent to a large extent on the coke as a source of carbon. Some of the carbon enters the molten product from the pig-iron and to a lesser extent from the scrap. When large quantities of steel scrap are used in the charge, the additional carbon required to bring the carbon content of the cast iron up to the desired level must come from the coke. This, however, presents a problem to the coke-producer for cokes apparently vary in their ability to supply carbon to the hot metal.

It is generally agreed that the carbon content of the cupola melt is dependent upon (1) conditions in the cupola, (2) composition of the iron and, (3) characteristics of the coke, which can be broken down into the following factors:

1. Conditions in the cupola—(*a*) Temperature of iron, (*b*) blast temperature, (*c*) moisture in blast, (*d*) length of time of contact of iron and coke, (*e*) amount of agitation and mixing, and (*f*) composition of gas above molten iron. 2. Composition of the iron—(*a*) Type of iron being melted, (*b*) carbon content of the iron and (*c*) kind and amount of other constituents in the iron. (3) Characteristics of the coke—(*a*) Carbon content of coke, (*b*) ash content of coke, (*c*) other constituents in coke, (*d*) nature of carbon-amorphous, graphitic, (*e*) size or active surface area of coke, (*f*) surface characteristics of coke, (*g*) reactivity of coke and (*h*) strength of coke.

Ruer and Birens[1] and Chipman[2] have shown that the amount of carbon picked up by the iron is highly dependent upon the temperature of the melt; the higher the temperature, the higher is the amount of carbon dissolved in the iron. At 1,500 deg. C, the former observed a value of 5.15 per cent. carbon in pure iron at equilibrium, while Chipman by calculation found 5.10 per cent. The temperature attained by the iron in the cupola is apparently affected by the condition of the bed, the characteristics of the coke, moisture in the blast[3], blast temperature, etc. According to Mayers[4], it is the physical rather than the chemical properties of the coke which are accountable to a large degree for high-temperature development and resultant high-carbon pick-up. Low reactivity in the coke is necessary for this development of high temperature. Large pieces of coke, especially in the lower part of the bed, must be obtained by the use of strong coke that can withstand breakage in its descent in the cupola.

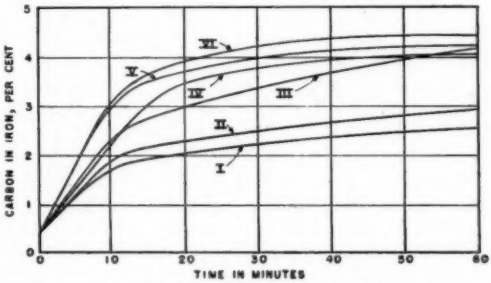


FIG. 1.—*Graph showing carbon-solubility rates in iron of some foundry cokes.*†

Coke which has the ability to supply the high-carbon pick-up apparently has properties that are closely related to cokes of low reactivity. According to evidence presented by R. V. Riley[5], electrode graphite dissolved in molten iron at a faster rate than any other type of carbon, and petroleum coke gave a relatively high rate of carbon solution. Anthracite, while lower than petroleum coke, was superior to the cokes tested. Riley also showed that carbon pick-up from coke is related to its ash content. Also, the accumulation of ash on the surface of coke prevents good contact of carbon to molten iron and results in lower carbon solubility. However, when a flux of sodium carbonate or borax was added to the coke, the carbon pick-up was increased very materially. In one test, sodium-carbonate treated coke gave a total carbon in the iron of 3.9 per cent., as compared to about 0.9 per cent. for untreated coke. This is an extremely

* The Paper was originally presented at the 1957 meeting of the American Chemical Society and received the Bituminous Coal Research Inc. award as the best paper on coal or derived products. It was subsequently published in *Foundry*, December issue, 1957. The Authors are connected with Koppers Company, Inc., Pittsburgh, Pennsylvania.

† The Roman numerals in Fig. 1 refer to specific foundry cokes but no further details of these are included in the original article and as, in any case, such would be of purely local application, it has not been considered worth while to enlarge on the matter.

Carbon pick-up in the Cupola

important finding and points to the conclusion that foundry coke should be of the lowest ash possible and also that the ash should have a low fusion temperature, or that a flux should be added to the coal before coking or to the coke.

Riley in his work developed an excellent small-scale test for determining the carbon solubilities of various coke and carbonaceous materials, as well as for evaluating the various factors which affect carbon solubility in iron. Briefly, his method consisted of melting aproximately 10 lb. of iron of

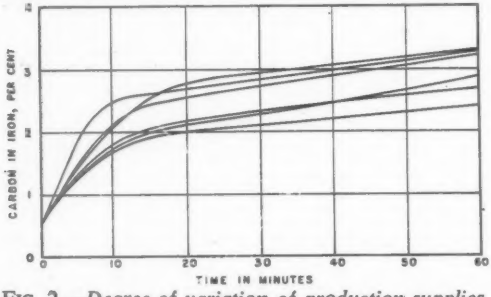


FIG. 2.—*Degree of variation of production supplies of foundry coke obtained from a single blend.*

low-carbon content in a high-frequency electric furnace. About a 2-in. deep layer of sized coke (¼ by $\frac{1}{16}$ in.) was placed on top of the molten mass maintained at 1,500 deg. C. for periods up to three hours. Molten metal samples were taken at frequent intervals and were analysed for carbon content.

Method of Testing

This method apeared to have so much merit that the Authors decided to make use of it in their foundry-coke investigations. However, because of the desirability of having a laboratory-scale test, using a small sample of iron and coke, as well as completing a test in a short time, the method described by Riley was modified in order to comprise these features. After some preliminary work, the procedure to be described in this article was evolved. After development of a procedure, a large number of cokes were tested. These cokes included those obtained in connection with foundry-coke investigations, some typical commercial foundry cokes, some containing various additives and others to demonstrate the effect of such variables as ash content, silicon content, and type of carbon. Because of the empirical nature of the test, the procedure will be described in detail.

Apparatus

The test is conducted in a two-pound capacity induction furnace (Ajax Electrothermic Corp. No. 3P2) powered by 6 kw. transformer and converter. The charge is placed in an alundum crucible of 2 in. I.D. and 3 in. deep (Ajax 3P2-A). A fused silica sleeve is placed inside the furnace adjacent to the coils. High-temperature insulation (crushed Johns-Manville 3,000 brick or equivalent) is packed underneath the crucible, and in the annulus between the alundum crucible and the silica sleeve. The top ½ in. of the annulus is filled with a high-temperature refractory cement. Water flows through the furnace coils and keeps the silica sleeve and exterior part of the furnace cool.

A platinum, platinum-rhodium thermocouple, whose bead is cemented to the outside bottom of the alundum crucible with Sauereisen P-78 cement, is used as a control on the temperature of the melt during the test. This thermocouple is calibrated by another platinum thermocouple, encased in a porcelain sheath. The latter couple is immersed in the melt at short intervals during the test in order to ensure that the temperature of the molten iron is maintained at 1,500 deg. C. ± 10 deg. C. This procedure was found necessary so that the porcelain dissolved by the iron would not interfere with the results of the test.

Iron in the form of ¼-in. diameter rods cut approximately 2 in. long is used as the standard or base iron. This iron (Society of Automotive Engineers' specification 1045) had the following composition: Carbon—0.45 per cent.; silicon—0.20; manganese—0.51; phosphorus—0.019; and sulphur—0.028 per cent. It was found especially important when using a new batch of iron that the silicon and manganese contents should be near to these values or significantly different results would be obtained when the same coke is tested.

Porcelain tubes of approximately ¼ in. o.d. and ⅛ in. i.d. are used as sampling tubes for the melt during a test. These are cut into convenient lengths (10 in.) and a medicine-dropper bulb is placed on one end.

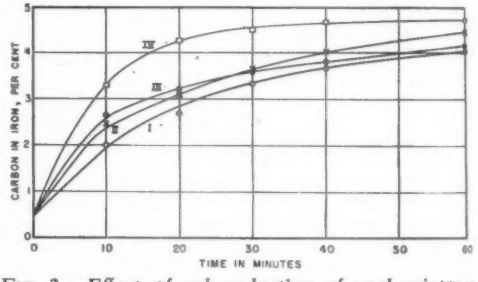


FIG. 3.—*Effect of ash reduction of coal mixtures by float-and-sink methods on solubility of coke in iron.*

Key:—Composition of coke. Curve I: Ash—9.3 per cent. Si—2.43 per cent, Fe—0.35 per cent.; curve II: Ash—7.2, Si—1.81, Fe—0.30 per cent.; curve III: Ash—5.8, Si—1.35, Fe—0.30 per cent.; curve IV: Ash—3.5, Si—0.73, Fe—0.23 per cent.

A mould fashioned from an insulating brick serves as a receiver for the hot metal upon completion of a test. A depression in the face of the brick is hollowed out to a depth of approximately one inch and the pores in the depression are filled with a suitable high-temperature cement.

Test Procedure

Approximately 400 gm. of iron is placed in the crucible and the furnace is covered with a suitable

refractory cover. Power is supplied to the furnace and after the iron is melted (about 15 min.) additional iron in about 100-gm. portions is charged until a total of 950 gm. is contained in the crucible. The immersion thermocouple is inserted and the temperature of the melt is adjusted to 1,500 ± 10 deg. C. The control couple is read and maintained constant throughout the test at the reading corresponding to 1,500 ± 10 deg. C. on the immersion couple. There is usually about a 50 deg. differential between the two couples.

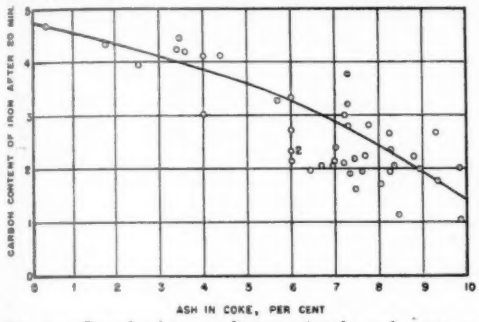


FIG. 4.—*Graph shows relation of coke ash-content to carbon solubility in iron.*

After the temperature of the melt has been brought to equilibrium at 1,500 deg. C. the coke to be tested, sized 3 by 6 (U.S. Standard Mesh) is poured on top of the molten mass to a depth of 2 in. or about even with the top of the crucible. No cover is placed at the top but the coke bed is maintained even with the top of the crucible. The test is timed from the start of the addition of the coke. Usually a test of one hour duration is sufficiently long to determine the carbon-solubility characteristics of a coke. No agitation of the metal is necessary since the high-frequency current keeps the molten metal in fairly violent agitation. This agitation is sufficient to ensure that a sample taken at any moment is representative of the total melt.

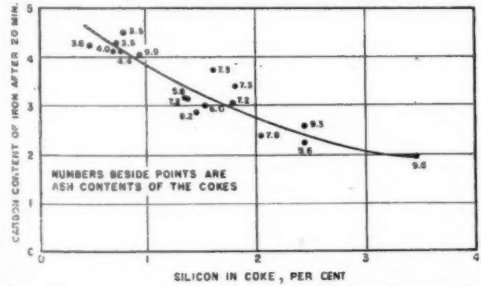


FIG. 5.—*Effect of silicon content of coke on the solubility of coke in iron.*

At intervals during the test (usually after 10, 20, 30, 40 and 60 min.) the melt is sampled for carbon analysis. The porcelain sampling tube, preheated in the coke bed, is plunged into the molten mass with the bulb depressed and then released. Upon removal of the tube and rapid cooling in air, cylindrical samples of iron ¼ in. by 2 in. long are obtained by breaking away the tube wall. These samples are analysed for carbon content. Upon completion of the test, the molten metal is poured into the brick mould. It is extremely important that the mould is dry before pouring in the hot metal. Before the crucible cools down, it is scraped clean for the next test. As many as eight tests have been made in a crucible before it required replacing.

Preparation of Cokes

Some of the cokes tested for carbon pick-up properties were made in full-scale ovens under foundry coking conditions. Other cokes were prepared either in an experimental pilot-scale oven or in so-called box tests. In the latter, about 16 kg. of the foundry coal mixture is carbonized in stainless steel boxes, 8 by 12 by 15 in. high, by placing these boxes in an experimental oven and carbonizing at foundry-coking temperature. Samples were prepared from the gross sample by crushing the latter in a jaw crusher through ½ in. and quartering the crushed product down to 3-5 lb. The 3 by 6 mesh size is prepared from this fraction by hand in an iron mortar with frequent screening so as to remove the desired size fraction as soon as it is made.

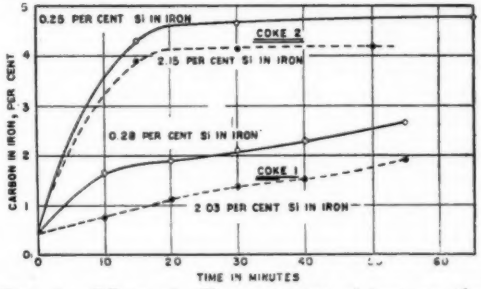

0.25 PER CENT SI IN IRON
COKE 2
2.15 PER CENT SI IN IRON
0.28 PER CENT SI IN IRON
COKE 1
2.03 PER CENT SI IN IRON
CARBON IN IRON, PER CENT
TIME IN MINUTES

FIG. 6.—*Effect of silicon content of iron on the solubility of coke in iron.*

Experimental Data

Reproducibility

Table 1 presents data on the degree of reproducibility of the carbon-solubility test when conducted in the manner described above. Five different cokes were tested in duplicate and the results cover a wide range of carbon contents. It is evident that the reproducibility, in general, is good. The overall average is about 0.08 per cent. carbon or about 1.6 per cent. of the saturation carbon content of pure iron at 1,500 deg. C. The standard deviation for the above data is also 0.08 per cent.

Solubilities of Some Commercial Cokes

A number of samples of different foundry cokes were tested by the carbon-solubility test and the

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solubility-rate curves obtained are presented in Fig. 1. It is to be observed that there is a considerable variation in the cokes tested, for carbon contents of the iron at the end of the test varied from about 2½ to 4½ per cent. The variation may be possibly more than shown for only a small number of cokes were tested. An indication of the day-to-day variation in cokes can be observed in Fig. 2. In this chart there are several curves shown of coke samples obtained from a single coal blend spaced over a period of approximately six months.

TABLE 1.—*Reproducibility of the Carbon-solubility Test.*

Coke.	Test.	Carbon content of iron.				
Time of contact (minutes) ..		10	20	30	40	60
A	1	2.06	2.35	2.47	2.56	2.59
	2	2.05	2.35	2.58	2.62	2.78
B	1	1.75	1.93	2.11	2.23	2.71
	2	1.62	1.87	2.08	2.35	2.69
C	1	0.72	1.17	1.40	1.55	1.91
	2	0.83	1.13	1.35	1.52	2.01
D	1	2.71	3.21	3.32	3.45	4.49
	2	2.68	3.00	3.44	3.65	3.82
E	1	3.47	3.83	3.88	4.01	4.04
	2	3.58	3.83	3.90	4.00	4.03
Average Variation—per cent. carbon		0.08	0.06	0.07	0.08	0.13
Minimum Variation—per cent. carbon		0.01	0.00	0.02	0.01	0.01
Maximum Variation—per cent. carbon		0.13	0.21	0.11	0.20	0.33

Variations of about one per cent. carbon may possibly be expected.

Effect of Impurities in Coke

In order to confirm the work of Riley on the effect of ash content of the coke on the solubility of the latter in molten iron, solubility tests were made on four cokes ranging in ash content from 3.5 per cent. to 9.3 per cent. These cokes were all prepared from the same three-component coal mixture in box tests as described above. Each of the individual coals was cleaned separately by float-and-sink methods to the desired ash content and the blends were made after cleaning. The results of the solubility tests on these cokes are presented in Fig. 3. The effect of ash content is obvious for reduction in ash content of the coke has progressively increased the carbon content of the iron, comparing after 20 minutes of test, from 2.6 per cent. to 4.3 per cent. The change in the petrographic nature of the coals with washing and the resultant change in the type of carbon is not believed to be much of a factor in this case.

A further demonstration of the effect of ash content is shown in Fig. 4 in which the carbon contents of the iron after 20 minutes of test is plotted against the ash content of a large number of miscellaneous cokes. Even though cokes of a wide range of characteristics are represented, a fairly good correlation is indicated between coke-ash content and carbon solubility in iron. The trend line shown passes nearly through 5 per cent. at zero ash content and through 1½ per cent. carbon at 10 per cent. ash content.

Sweetser[6] showed that in the blast furnace "silicon drives out carbon." This is confirmed in Fig. 5 in which the carbon pick-up is plotted against the silicon contents of many of the cokes represented in Fig. 4. Apparently, a good correlation exists between the two. This is not surprising, however, on the basis of the preceding figure, for silicon is the major component of ash and a similar correlation should exist. The numbers beside the points in Fig. 5 are ash contents and, in general, the ash contents increase in going down the curve. There is one notable exception. The lowest point on the curve is for a coke (9.6 per cent. ash content) made from a coal mixture to which 5 per cent. silica sand was added; the carbon in the iron from this coke amounted to about 2 per cent. However, near the other extreme of the curve is a coke (9.9 per cent. ash content) made from a coal mixture to which 5 per cent. iron ore was added; the carbon in the iron from this coke amounted to about 4 per cent. This suggests the possibility of addition of iron ore to the coal mixture in order to improve the carbon pick-up properties of a foundry coke.

Effect of Iron Composition

As shown above, silicon in the coke retards the solution of carbon in iron. The effect of silicon in the iron was therefore tested also. The standard iron for the carbon-solubility test contains about 0.20 per cent. silicon. Two cokes were tested in a standard iron and also in standard iron to which about 2 per cent. silicon was added in the form of pure ferro-silicon. Fig. 6 presents the rate-of-solubility curves obtained. For each coke the curves for the higher silicon irons are somewhat below those for the standard irons.

The effect of the manganese content of the iron was also tested. It was found by accident that manganese has a considerable effect on the rate of carbon solubility. Whereas in the past S.A.E.* 1045 standard iron was obtained from one source, a batch was obtained from a different supplier. After a number of tests had been made, it was observed that considerably higher solubilities were obtained. By process of elimination the difference in manganese content between the irons from the two different sources was found to be accountable. Chipman[7] and Turkdogan[8] have recently shown that this is true. Fig. 7 shows the result of the present study. By increasing the manganese content of the iron from 0.51 to 1.56 per cent. the carbon content of the iron using Coke A had increased from about 2 per cent. to 3½ per cent. and for Coke B the increase was from about 2½ per cent. to 4 per cent. These results suggested the addition of manganese compounds to the coal mixture and the results of such a study are presented in a later section.

Effect of Coking Time

A series of tests was made to determine the effect

* (American) Society of Automotive Engineers

of carbonizing conditions, specifically coking time. The same foundry-coal mixture was carbonized in full-scale coke ovens of approximately 18 ins. in width at coking times of 17, 24, and 28 hours. Carbon-solubility test data on cokes made at these coking times are plotted in Fig. 8. These results indicate that coking time has a slight effect on carbon pick-up. The longer coking times appear to be conducive to higher carbon solubility, although there does not seem to be much difference between

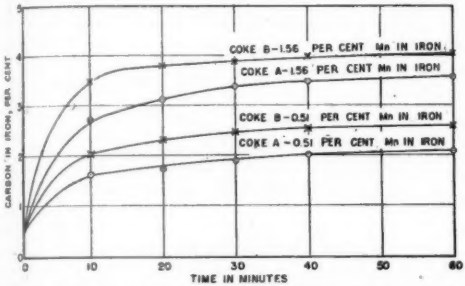
COKE B-1.56 PER CENT Mn IN IRON
COKE A-1.56 PER CENT Mn IN IRON
COKE B-0.51 PER CENT Mn IN IRON
COKE A-0.51 PER CENT Mn IN IRON
CARBON IN IRON, PER CENT
TIME IN MINUTES

FIG. 7.—*Effect of manganese content of iron on the solubility of coke in iron.*

the 24-hour and the 28-hour curves. Whether the greater carbon solubility is due actually to the longer coking times or to the lower attendant carbonization temperatures is not known.

Effect of Additives in the Coke

Riley found that the presence of lime and an atmosphere based on air at normal pressure tended to increase the solution of carbon in molten iron. This improvement in carbon content was attributed to the formation of calcium-carbide. In the present study, additions of 1, 2 and 5 per cent. lime were made to a coal mixture and the cokes from each were tested in the solubility test. Fig. 9 illustrates the rate of carbon-solution curves for these cokes. It will be observed that 1 per cent. lime effected very little change over that

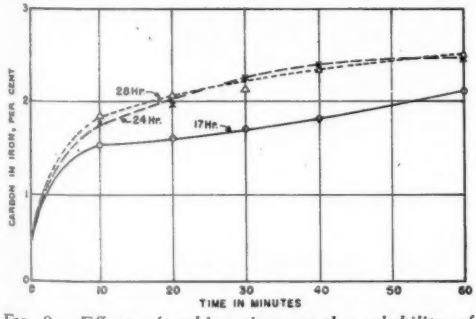

FIG. 8.—*Effect of coking time on the solubility of coke in iron.*

of no addition. The addition of 2 per cent. lime 5 per cent. addition of lime, the rate of solubility but after 40-odd minutes the same carbon content was attained as for the blank at the same time. For 5 per cent. addition of lime, the rate of solubility of carbon remained low throughout the test. Thus the addition of lime was found to be of no benefit in this study.

Fig. 10 presents the results of a similar study with the addition of soda ash to the coal mixture. In this case, 1 per cent. addition of soda ash made no improvement in carbon content, but 2 and 5 per cent. addition effected a considerable increase, from about 2½ per cent. carbon to 3½-4 per cent. carbon These results, therefore, confirm those of Riley, although the latter obtained more improvement. The explanation offered for the increased carbon pick-up in the presence of soda ash is that the ash formed on the surface of the coke through combustion is fluxed by the soda ash. Thus the ash is sloughed off the surface of the coke so that carbon surface is presented more readily to contact with molten iron with a resultant higher solubility of carbon in iron.

As shown above, higher-manganese iron dissolves more carbon than does a low-manganese

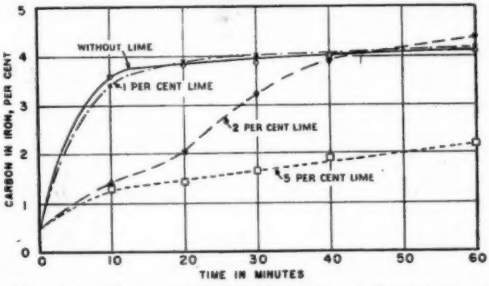

FIG. 9.—*Effect of lime addition to coal mixture on the solubility of coke in iron.*

iron. The mechanism advanced by Turkdogan for this behaviour is that manganese carbides are formed. Fig. 11 presents the results of addition of ¼, ½, 2, and 5 per cent. of manganese dioxide to the coal mixture prior to carbonization. Apparently, the addition of manganese to the coal mixture is beneficial in regard to carbon pick-up.

Discussion

This paper has presented a procedure for assessing foundry cokes as to their carbon-solubility characteristics in iron. It is believed that the method has a great deal of merit for this purpose and fills the need for such a test for the coke-producer and coke-user. The study presented is not intended to be comprehensive in scope, but is rather designed to demonstrate the possible usefulness of such a test to both the coke-producer and to the foundryman as a control method or a research tool.

The test presented is empirical and all data are relative provided the conditions of testing have not been changed. No attempts have been

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made to correlate results of the test with actual performance in the cupola. Such a correlation is highly desirable, but comparative data were not available to make this study.

In the preliminary development of the test procedure, other conditions were tried. Using less iron, 450 instead of 950 gm., and 3 by 12 mesh coke instead of 3 by 6 mesh coke was found to be unsatisfactory. Higher carbon contents were obtained because of the somewhat higher ratio of coke surface to volume of iron. Even cokes which were poor carbonizers gave very rapid rates of carbon solutions, and as a result the over-all range of carbon contents for a variety of cokes was somewhat smaller than for the same cokes tested by the present procedure.

This study has shown that ash content of the coke or its major constituent, silicon, has a significant inhibiting effect on carbon solubility in the iron. In addition, the type of iron apparently is instrumental in the amount of carbon pick-up. It was demonstrated that admixtures of various materials with the coal mixture prior to carbonization can also significantly affect the amount of

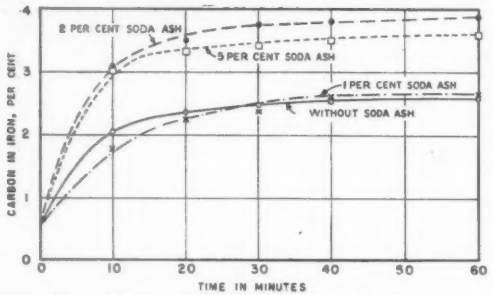

FIG. 10.—*Effect of soda-ash addition to coal mixture on the solubility of coke in iron*

carbon dissolved. Soda ash and manganese dioxide were found to be effective agents.

Correlations were attempted with such properties as the wet oxidation index[9, 10], which is said to be a measure of the amount of graphitization undergone by the coke, and with ash fusion temperatures. No satisfactory relationships were obtained. Intentional addition of 2 and 5 per cent. graphite to a coal mixture resulted in no appreciable improvement in the solubility characteristics of the coke.

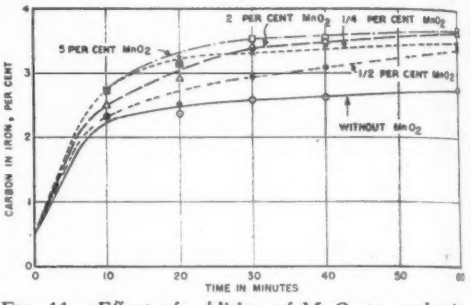

FIG. 11.—*Effect of addition of MnO_2 to coal mixture on the solubility of coke in iron.*

The softening temperature and the fluid temperature of the ash of coke also presented no significant correlation. However, cokes having an initial softening temperature of less than 1,315 deg. C. exhibited relatively high-carbon solubilities. When the initial softening temperature of the ash exceeded 1,315 deg. C, the solubility of carbon in iron decreased appreciably.

Acknowledgment

The Authors are indebted to Mr. H. J. Meredith of the Koppers Company, Inc., on behalf of the Gas and Coke Division who sponsored the work on the development of the test method. They are also indebted to Mr. H. V. McGurl, under whose direction the work was done, and to Mr. H. B. Smith, who did much of the preliminary development of the method.

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Light-alloy Ingots. A well-produced spirally-bound 32-page catalogue carried between stout black backs has been received from J. Frankel (Aluminium) Limited, aluminium-ingot and light-alloy manufacturers, Victoria Works, Alma Street, Wednesbury, Staffs. In it, details of the service accorded to customers; notes as to the prevention of scrap castings; heat-treatment; golden rules to aid production and a complete range of specifications are all carefully set out. The whole makes a useful publication for light-alloy founders to keep on their shelves.

High-duty Iron Castings. Ashmore, Benson, Pease & Company, Stockton-on-Tees, in publication No. MC 657 detail the properties of their castings made using the Meehanite process. There is a particularly interesting picture of an 11¼-ton water-gas generator-base casting now made in one piece through the use of CO_2 practice. Good examples are illustrated of wear-, corrosion-, shock-, and heat-resisting castings. Finally, a centre-lathe with a 23-ft. dia. face-plate, is illustrated to show the heavy type of work undertaken.

Equipment & Supplies

Fork-lift Truck

Ransomes, Sims & Jefferies, Limited, of Ipswich, are now producing new fork-lifts, based on their "FL" series. The latest of these, the NR 20 (Fig. 1), a development of the FL 2000, is about to enter the market. It conforms to the new international standards for such vehicles which have been defined in a series of stability-tests. The new model can transport and stack loads of up to 2,000 lb. at a load centre of 24 in., and up to 2,240lb. at 20 in. The standard freelift is 4 in. and the lift can vary as required from 96 in. to 168 in. Both foot and hand brakes are provided, incorporating internal expanding brake shoes. Steering is through an enclosed Marles oil-bath steering box operating on the rear wheels.

To meet the special needs of fork-lift operators there are a number of attachments available. Amongst these are the operator's overhead guard, load back-rest, load clamp, rotary forks, fork extensions, crane attachment, Bickerstaff brick forks and pipe lifters. Also available are a ram for loads with a centre opening, a swarf handling hopper, bin attachment, load stabilizer, rotating paper roll clamp, and a side shift to facilitate close manœuvring. Another feature is the check valve to control the descent of heavy breakable loads.

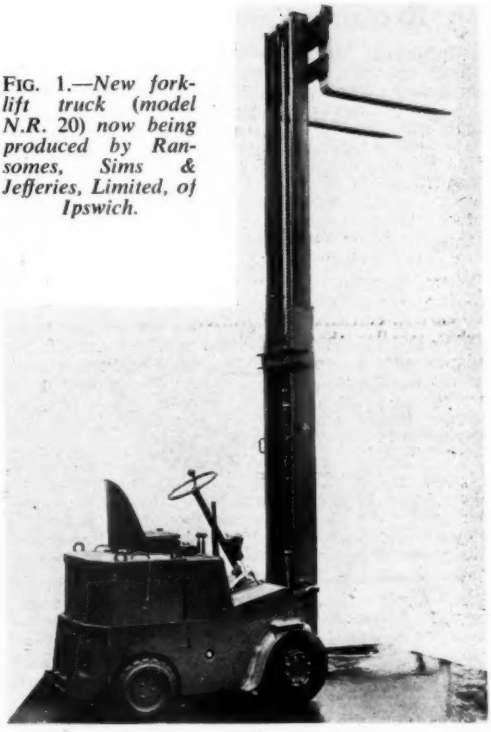


FIG. 1.—*New fork-lift truck (model N.R. 20) now being produced by Ransomes, Sims & Jefferies, Limited, of Ipswich.*

Layer Process for Metal-treatment Baths

The Paints Division of ICI Imperial Chemical House, Millbank, London, S.W.1, has introduced a new process—the "Serseal" layer process (British patents applied for)—for eliminating fumes and steam from aqueous-metal treatment baths and for reducing heating costs. The process seals the tank surfaces with a layer of inert material and this not only checks fumes and steam but also reduces the amount of heat needed to keep the bath at a working temperature.

Because the method eliminates steam and condensation, exhausting equipment can often be dispensed with. The process can be operated without alteration to the processing tank. An advantage is that, owing to the reduced heating requirements, heating units need much less frequent cleaning.

The method was developed primarily for use in baths producing heavy phosphate coatings and certain precautions are necessary where work is to be subsequently painted. Alternative grades are available to suppress acid fumes and spray from pickling tanks and to conserve heat in alkaline vats.

Electronic Hygrometer

Shaw Moisture Meters, 31, Market Street, Bradford, have placed on the market a new hygrometer operating on an electronic principle. The small detecting element (10-mm. dia. by 60-mm. long) consists of a capacitor with a hygroscopic di-electric only a few microns thick with a 24-carat gold electrode. It is claimed that this new model has an immediate response, stable characteristics and incorporates provision for easy checking and standardizing, as well as remote reading. The model would seem to have potential application for use in the moisture testing of foundry sands.

MILLETT, LEVENS (ENGRAVERS), LIMITED, of Stirling Corner, Barnet by-pass, Borehamwood, Herts, have placed on the market a new range of self-adhesive metal and plastics nameplates which do not require an activating solvent. The nameplates can be applied to most surfaces provided that these are clean and free from dust.

KODAK, LIMITED, of Kingsway, London, W.C.2, have introduced a new 75-w. sodium "Safelamp" for use when processing bromide printing papers. It gives a diffused orange-red illumination by a combination of sodium light with filtered tungsten light, which, it is claimed, prevents the "livid" effect of sodium lighting alone and gives pleasant working conditions. The lamp is cylindrical and contained in an outer case of Perspex. Ceiling suspension is arranged from a block into which the electrical connections from a special transformer and a P.F. capacitor (for 50-cycle a.c. 200-250 v. only) for the operation of the lamp are also supplied. A life of 4,000 hours is claimed for the lamps.

IN A LEADING ARTICLE in the JOURNAL of January 23, reference was made to what appeared to be a new type of chaplet, namely one with a core-sand filled tube. It has been brought to the Editor's notice that two firms, Precision Presswork Company, Limited, Coleshill Street, Birmingham, 4, and A. Lakin & Son, Limited, Station Works, Beauchief, Sheffield, 8, manufacture a wide range of this type of chaplet.

MULLARD, LIMITED, Torrington Place, London, W.C.1, have placed on the market a new type of photo-electric cell which may permit the cost of many industrial control and detection devices to be reduced substantially. The new cell incorporates a specially-constructed photo-sensitive element of cadmium sulphide, and is remarkable for its extremely high sensitivity: it is, in fact, some 20,000 times more sensitive than the conventional photo-emissive cell.

Rateable Value Reductions

Reductions agreed between the local valuation officer and John Thompson, Limited, Wolverhampton, in respect of the rateable value of seven of the company's subsidiaries' premises, works, and offices in Bilston and Coseley, were confirmed at a Wolverhampton Valuation Court recently. Mr. F. J. Shuttleworth, appearing for the valuation officer, said that reductions of about 5 per cent. had been agreed where premises were not equipped with canteens and other similar exemptions, and could not therefore be let as composite works.

Another appeal by John Thompson Water Tube Boilers, Limited, Coseley, was adjourned, and five others were withdrawn.

The court also agreed to reduce the rateable value of premises owned by Thompson Bros. (Bilston), Limited (not a member of the John Thompson group), at Great Bridge Road, Bilston. The company has workshops on both sides of the road, which were previously valued separately. It was decided that they should be valued as a composite whole.

A claim by the Wolverhampton Metal Company, Limited, for reductions in the rateable value of its Wednesfield Works, was also agreed by the court, but a second claim by the company for similar reductions at its washing plant and premises at Rookery Street, Wednesfield, was withdrawn.

A reduction has been granted to Joseph Sankey & Sons, Limited, in respect of its works, offices, and premises in Bilston and Coseley.

Outlets for Blast-furnace Slag

Blast-furnace slag—at one time dumped on unsightly heaps and regarded as an unfortunate but inevitable by-product of ironmaking—has become big business. At the Scunthorpe works of the Appleby-Frodingham Steel Company last year, for example, 1,226,430 tons out of the 1,838,780 tons of slag produced found a commercial use. Most of it was sold in the air-cooled form as ballast, road stone, concrete aggregate or as coated products.

Slag cements are becoming increasingly popular, too, particularly in the construction of large concrete structures; one advantage over conventional Portland cements is the lower quantity of heat liberated during setting and hardening. Nearly 12,000 tons of Appleby-Frodingham slag went into the construction of the Avon Dam in Devon, which was completed last year.

Large Dollar Order for English Electric

A further contract for the supply of two more water-turbine generating sets for the Priest Rapids in the State of Washington, has been received by the English Electric Export & Trading Company, Limited. Each will be of 83,000 kva at 85.7 r.p.m. The order is worth some $5,500,000.

The company, which is already supplying the first eight turbines and generators for Priest Rapids, will now be installing plant comprising 10 114,000 h.p. water turbines and 10 generators, each having an output of 83,000 kva at 85.7 r.p.m. Five transformers of 183,000 kva. to raise the generating voltage from 13,200 to 230,000 for transmission to the various consuming centres, are also being supplied.

Clean Air Act

Smoke from Industrial Chimneys

When MR. JOHN LEAVEY (Con.) asked in the House of Commons last week what research work the Fuel Research Station had undertaken on the measurement and reduction of smoke from industrial chimneys, MR. HARMAR NICHOLLS, Parliamentary Secretary to the Ministry of Works, said that the Fuel Research Station of the Department of Scientific and Industrial Research had devised two new types of instruments to simplify the measurement of smoke. One would enable a stoker in the boilerhouse, and the other a smoke inspector outside to know when smoke darker than the legal limit was being produced. To reduce smoke, the Research Station had developed successful smoke eliminating devices for industrial hand-fired boilers. These not only reduced smoke to a minimum but also saved fuel.

MR. LEAVEY further asked if the Parliamentary Secretary could say specifically that this work was directed to furthering the purposes of the Clean Air Act. Furthermore, if these devices were widely employed, could fuel economies be expected from their use.

MR. NICHOLLS: "The work certainly helps considerably in reducing atmospheric pollution; there is no doubt about that. If these devices were fixed to all the boilers to which they could be fixed, there would be a saving of 1,000,000 tons of coal a year."

Offer for Hurst, Nelson Shares

Shareholders of Hurst, Nelson & Company, Limited, have now received the formal offer by Charles Roberts & Company, Limited, of four 5s. ordinary shares for each £1 ordinary share of their company, plus 5s. cash per share. The final acceptance date is March 28, or not later than May 31, as the directors of Charles Roberts & Company may agree.

The trading results of the latter company for 1957-58 are not expected to differ materially from those of 1956-57. To the paid interim of 4½d. per 5s. unit is expected to be added a further 4½d. per unit.

The board of Hurst, Nelson & Company is not able to forecast ordinary dividends for 1957-58. Results are not likely to show any improvement on those for 1956-57. If the bid goes through, the directors of the company, other than Mr. J. Waddell, will retire and will be compensated.

Newton, Chambers—Ransomes & Rapier Merger

Directors of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, and of Ransomes & Rapier, Limited, Ipswich, recommend the acceptance of the proposed merger between the two companies. The merger will be effected by an exchange of shares on the following basis:—Four Newton £1 ordinary for every nine Ransomes 10s. ordinary; three Newton 5 per cent. £1 preference for every five Ransomes 6 per cent. 10s. preference, plus 6d. cash for each share exchange; one Newton 5 per cent. £1 preference for every Ransome £1 "B" preference, plus 6d. cash.

The offer closes on March 25, unless extended. The ordinary shares to be issued by Newton, Chambers will rank for the final dividend of 10 per cent. for 1957.

Choice of Abrasive*

The topical and practical matters of which abrasive to use and how to approach the installation of shot-blasting plant are dealt with in these abstracts from a paper read to South African foundrymen.

A paper on the "Practical Aspects of Abrasive Cleaning in the Foundry," was read before the South African branch of the Institute of British Foundrymen at one of the recent meetings. In it, the author, Mr. J. F. Attwell (director, Victor Kent (Tvl.) (Pty.), Limited) after first surveying the various types of plant- and foundry-cleaning methods in particular, spoke at some length on the choice of abrasive. What follows is an extract from his remarks on this subject:—

Too often an abrasive is ordered without careful consideration and, in the author's opinion, there is in this country (South Africa) a tendency to use an abrasive which is too large. Perhaps behind this there is the idea that by such means the breakdown is slower and less expensive, but, provided the abrasive is to specification, this is not entirely correct, since the larger abrasive may give a slower cleaning speed and higher total cost.

The author considers, from experience, that consistent with its applications, the smaller the particle size of an abrasive the more effective the abrasive can be. The reason is this its flow through an orifice of given dimensions will be greater than that of the larger-particle abrasive. Naturally this view can be taken to extremes but it has been established that unless a large-diameter nozzle is used for large abrasives the flow is not sufficient.

The author's experience has been that angular chilled-iron grit cleans faster than round chilled iron-shot. Moreover, there are applications where round shot is not desirable.

Typical applications for the use of angular grit are on materials for vitreous enamelling, metal spraying and galvanizing. The matt surface obtained by angular grit is essential for these applications. Chilled-iron abrasive is made in several sizes and different manufacturers appear to have their own codes, although there is a British Standard Specification for this material. For easy reference here, standard wire gauges are convenient for distinguishing the sizes.

Typical applications are as follow: (*a*) For cleaning annealed steel castings, 14 gauge grit at 80 lb. per sq. in. gives good results. (*b*) For grey-iron castings 18 gauge grit at 60 lb. per sq. in. (*c*) For malleable castings to be galvanized, 16 or 18 gauge grit. (*d*) For cleaning of non-ferrous castings good results are obtained with 24 gauge grit at 35 lb. per sq. in.

An important application of abrasive cleaning is the preparation of castings for vitreous enamelling. For this application 16 gauge grit at 60-80 lb. per sq. in. is satisfactory. Special applications include descaling of case-hardened parts when 30 gauge grit gives a smooth shiny finish at approximately 40 lb. per sq. in.

Cast-steel Shot for Blast Cleaning

More recently another material—cast steel in the form of shot—has been produced for blast cleaning. This is annealed after manufacture and extra life up to 800 per cent. over chilled iron is claimed for it. It is significant that cast-steel shot, which preserves its shape and size for long periods, is not made in large sizes. Cast-steel shot is not yet used extensively for applications where a sharp rough surface is required, such as for enamelling, and in such cases better results are obtained with angular iron grit. This provides a rough surface and breaks down more readily into sharp pieces, maintaining the sharp edges. An angular cast-steel grit of the same type is only suitable for short periods because it more readily becomes rounded in use. It appears, therefore, that the use of annealed cast-steel shot will never entirely replace chilled-iron grit at least for some applications.

Installation of Plant

Mr. Attwell also had a number of pertinent comments to make on the installation of plant in foundries. For example, he says, it is not possible to give hard and fast rules about the type of plant required for a particular foundry. Often, economic considerations rule out the installation of the correct plant. Generally speaking, in a large foundry the choice is easier than in a small foundry. Most foundries have compressed air installed, and so there is a tendency for air-operated plant to be used. What is not always realized, however, is that even one shotblast plant uses a considerable amount of air, and the compressor installed may not supply the extra demand. Double shifts can be worked to overcome this difficulty in spite of its obvious disadvantages.

It is important to know the amount of compressed air which is required to operate shotblast plants. Often plants are installed by firms without confirming with the manufacturers the amount of air required. It is essential for the manufacturers and suppliers of equipment to point this out to prospective users.

The size of the shotblast pressure cylinder has no bearing on the quantity of compressed air necessary. This is determined by the size of the nozzle and the pressure at which the plant works. Many firms contemplating the purchase of shotblast plant already have compressors installed. It is then only necessary to be sure that the extra demand can be supplied. When purchasing new compressors, how-

* Abstracted from the (South African) *Engineer and Foundryman.*

Choice of Abrasive

ever, it is advisable to consider the actual delivery of air per minute rather than the piston displacement. There may in fact be a considerable difference between piston displacement and actual delivery of air.

One usually finds the shotblast plant hidden away in the corner of a foundry, the minimum amount of money having been spent on its design and installation, and yet this plant can be largely responsible for the appearance of the finished product. There is no doubt that a shotblast plant is often rather dusty and unsightly. It is possible, nevertheless, to instal plant which can be erected in the workshop, is comparatively dust free, operates with a minimum of trouble and is designed in such a way that handling of the castings is reduced to a minimum.

Metallurgical Abstracts

The Heat-treating of Grey and Ductile Cast Irons. (*Iron Age. Heat-treatment Supplement.* 1957. Vol. 180; No. 17; pp. 215-6.) The three chief reasons for heat-treating grey-iron castings are:—(1) To relieve casting and/or machining stresses, (2) to improve machinability, and (3) to provide a variety of physical and mechanical properties which might be desirable for application and service. The effective stress-relieving temperature range of grey-iron starts at about 510 deg. C. In some instances, 650 deg. C. may be required, especially for irons alloyed with chromium, nickel, or vanadium. Most stress-relieving cycles for grey iron are relatively short. Rate of cooling from temperature should always be slow. Annealing invariably provides a grey iron that is easiest to machine. The recommended annealing temperature for unalloyed grey irons or those with a low-alloy content is 760 deg. C. To produce optimum mechanical properties and maximum wear resistance, grey-iron castings must be heated above the transformation temperature and rapidly cooled. This means heating to not less than 815 deg. C. and cooling must be fast enough to depress the normal conversion from gamma to alpha iron and form a martensitic structure. Chemical analysis may have a marked effect on response to hardening, but good results can be obtained when the carbon content does not exceeed about 3.3 per cent., and silicon is kept below 2.0 per cent. In order to obtain better casting, these limits may be exceeded. To get maximum hardening, it is often necessary in these cases to compromise by adding small amounts of alloying elements. All of the conventional techniques used to heat-treat steel can be applied to ductile iron. These castings are not affected structurally by a stress-relieving treatment. Stress-relieving temperatures range from 538 to 676 deg. C.

"An Efficient Method of Desulphurizing Liquid Pig-iron." B. TRENTINI, L. WAHL, and M. ALLARD. (*Journal of Metals.* 1957. Vol. 9; No. 9; pp. 1,133-9.) The authors describe a new method of desulphurizing liquid pig-iron. This is characterized by very efficient conditions of contact between finely ground burnt lime, blown through immersed tuyeres by means of a neutral or reducing gas stream, and the metal bath to be treated. Liquid pig-iron is poured into the converter in its horizontal position, and, after a sample of metal has been taken, nitrogen and lime are blown in. As soon as a white cloud appears at the nose of the converter, it is tilted into its vertical position for the whole length of the blow, which lasts about 3 min. At the end of this period, the converter is tilted down to the horizontal, and the lime and nitrogen supplies are stopped. After sampling the metal bath, the liquid pig-iron is poured into a ladle, and retained lime runs out of the converter when it has been completely tilted down. The method appears to be efficient, as a sulphur content of less than 0.003 per cent. can be achieved easily, and a high-sulphur pig-iron (with, say, 0.300 per cent. sulphur) can be desulphurized thoroughly. Sulphur evolution curves show a sharp drop at the beginning of the blow. It is not necessary to have a holding period to allow the sulphurized particles to rise up through the metal. Experiments have shown that on a mass of 2.75 tons of metal, a lime consumption of 2 per cent. of the weight of the metal makes the sulphur content drop from 0.100 per cent. to less than 0.010 per cent. The high concentration of lime in the gas stream leads to a very small thermal loss resulting from the blowing of the gas. This method can be applied to all the different problems of pig-iron desulphurization encountered in foundries.

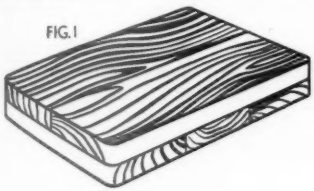
Carbon-hearth Linings of Blast Furnaces. ANON. (*Iron Age.* 1957. Vol. 180; No. 9; p. 74.) The first American blast furnace to operate with an all-carbon hearth lining is down for repair after 11 years' operation and with a production of 2,720,000 tons. Examination of the carbon sidewall brick showed it to be good for many furnace campaigns to come. This lining outlasted two ceramic stack linings. The original installation was built of 4 by 11 by 18-in. straight and key bricks. Laid against the hearth-cooling staves, the bricks were bonded together with carbonaceous cement. The wall was faced with 15 in. of ceramic brick to protect the lining. The carbon portion of the bottom consisted of two layers of solder course. Blocks 4 by 8 by 12 in. were laid with each course rotated 45 deg., and total bottom thickness was only 24 in. Examination of the bottom found the salamander to be quite flat, but below the carbon. Research has shown that the depth of the carbon bottom should be approximately one quarter of the hearth diameter to provide an iron "freeze line" in the carbon hearth rather than below it. The performance of the carbon lining is attributed to the combination of the physical and thermal properties of carbon, together with the extreme care in preparing and installing the lining blocks. Of significance is the placing of the lining directly against the hearth-cooling staves. In addition to its long life, the carbon sidewall can be built thinner with a consequent increase in hearth area, providing increased production.

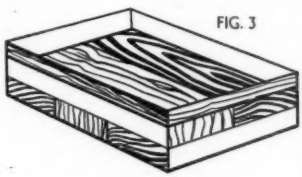
Wooden Squeeze-boards for Moulding Machines

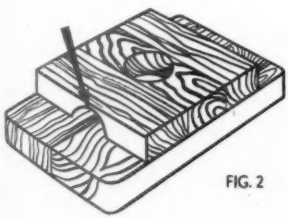
By "Checker"

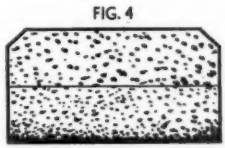
Moulding machines operating with a squeeze action are amongst the most popular types in use in foundries; they include simple hand-operated machines where the pressure required for moulding is provided by the downward pull of a large lever, this depresses a head on to the actual mould top, and packs the sand. Many other squeeze-type machines are power driven and some also include the jolting action as incorporated in the more modern jolt/squeeze type.

The platens on all these machines usually need a squeeze-board to make contact with the sand in the box. These are often secured firmly to the platen, there are, however, occasions when the squeeze-board is used separate from the platen. In this case it is placed on the mould top and the platen depressed to give the desired sand packing. These boards are either made of wood or metal (when made in metal, aluminium is generally considered to be the most satisfactory).









FIGS. 1 TO 4.—*Diagrammatic sketches of three types of wooden squeeze-boards, and of the mould produced;* FIG. 1, *plain type of board for use in a standard box, on a squeeze-type moulding machine;* FIG. 2, *a similar board with a circular hole taken out, to permit the use of feeder-head or riser extensions to the pattern; also shown (arrowed) are hand holes for ease of manipulation;* FIG. 3 *shows a squeeze-board for use in snap-flask moulding, incorporating bevelled edges which produce facets in the mould, as shown in* FIG. 4, *an end section.*

Fig. 1, a diagrammatic sketch of a flat type of squeeze-board made in wood, shows that it is constructed in two layers, with the grain running in opposite directions so that maximum strength is obtained, with any possibility of twisting or warping being prevented. The different pieces of wood are usually secured together by either nails or screws. All squeeze-boards must be made so that they can work within the moulding boxes, and, therefore, the actual finished size should be less than the width and length of the boxes with which they are used. This will ensure that they do not foul the outer edges of the box, when in their working position and when pressure is applied.

On some occasions, an extension to form the shape for a feeder-head or riser is attached to the pattern and this may extend to the mould top; it is then necessary to have the squeeze-board cut away at these points to permit the desired downward movement when squeezing occurs. Fig. 2 illustrates how this can be accomplished and shows a round hole cut through the board. This hole must be larger than the pattern part that extends to the mould top, to give a reasonable amount of clearance. To assist the operator, when positioning the board on the moulds, two suitable hand holes are included (arrowed), these being situated at each end. They are usually cut out with a gouge, and all sharp corners are removed.

Snap-flask Moulding

Another type of squeeze-board, shown in Fig. 3, can be used for snap-flask moulding; as can be seen, it has bevelled edges, these edges ensuring that when finished, and the snap-flask removed, the mould will have a sharp edge around the sides, as is shown in Fig. 4 (an end view of a completed mould when using these types of squeeze-boards). These boards, when constructed in wood, are made in similar fashion as for the previous examples (that is, with two layers of wood with the grain running in opposition). The bevel portion round the edges is made separately and secured with glue and nails, whilst the corner joints are mitred at 45 deg.

When squeeze-boards are to be used with moulding boxes containing bars, it is essential that clearance is given, and the boards are cut away to register with the bar positions (at least through the one layer of timber) so that direct pressure cannot be exerted on the bars.

Notes from the Branches

South Africa

The South African branch of the Institute of British Foundrymen held its first meeting of the year in the Pharmacy House Auditorium, Johannesburg, on January 23. The lecturer was a visitor from England, Mr. W. W. Braidwood, of the Mond Nickel Company, Limited, his subject being "S. G. Iron—A Versatile Engineering Metal."

The Author commenced by outlining developments in methods of introducing magnesium to the base metal for producing spheroidal-graphite iron and stated that the invention of the pressure chamber, using compressed air, now permitted the production of 27 tons of fully treated iron per hour. He said that nearly all s.-g. iron produced to date had come from foundries designed for the manufacture of castings in other metals, and the full potentialities of s.-g. iron could not be developed until it was made in shops or foundries specially designed and equipped for that purpose. Happily, he said, this was being appreciated more and more.

The provision of suitable facilities began with melting. For the preparation of s.-g. iron, the charges must include relatively expensive pig-iron, the tapped metal would be high in sulphur, and would require proportionately heavy treatment with corresponding loss of temperature; for these reasons the conventional cupola had marked disadvantages. Improvement could be effected, Mr. Braidwood continued, by heating the cupola blast and operating with a basic slag, but, often, the most desirable arrangement involved electric melting of synthetic iron from charges consisting of steel scrap and carbon. All types of electric furnaces were employed but the recently-developed, coreless, mains-frequency furnace which particularly suited the iron foundry was coming into greater use for this purpose.

Versatility

In dealing with the versatility of s.-g. iron, the Author gave as an example of its use at low temperature, the choice of this metal for essential parts of the sleds carrying equipment in "Operation Deep Freeze"—the US expedition to the Antarctic during the Geophysical Year, 1957-58—and operating at temperatures as low as −70 deg. F. In Europe, s.-g. iron was already established with marked success for instance in the logging plants of Northern Finland; it had replaced steel in service under Arctic conditions at temperatures as low as −40 deg. F. for such parts as chain link and "dogs" in the chain conveyors used for transportation of timber.

Dealing with various other uses for the metal, Mr. Braidwood stated that it was well known that s.-g. iron was widely applied for metal-working rolls but it might not be generally realized that it was also establishing itself in the auxiliary equipment of rolling mills, particularly for rollers of the general type which handled hot ingots, blooms and billets; also for those rolls which support or direct steel strip.

In conclusion, Mr. Braidwood pointed out that it was barely eight years since commercial production of s.-g. iron had begun. Manufacturing licences had been granted by the Mond Nickel Company and the International Nickel Company, to a total of more than 350 firms in 27 countries; output was already large and much practical experience had been accumulated. The metal was now in use on road and rail, at sea and in the air; and there was no maior industry not already using it. The lecture and subsequent discussion was concluded with a hearty vote of thanks to the Author.

East Anglian Section

The East Anglian section was well supported at its meeting on February 18, when 46 members and guests were present to hear Mr. R. M. Blandy (of Blandy, Isbill & Company, Limited) give his paper on "Mechanization of a Small Jobbing Foundry." The paper had previously been presented by the Author to the Slough and Beds & Herts sections of the Institute (and had also been published in the FOUNDRY TRADE JOURNAL, in November, 1956).

It was a short paper, judging by usual standards, but this was to the advantage of members who had many points they wished to raise with Mr. Blandy, and there was no lack of questions in the discussion which followed. All aspects of the paper were discussed including technical, practical and financial, whilst some of the questions were of general interest away from the main theme. To all these, very frank replies were given, and everyone agreed with the sentiments expressed by Mr. Maytham in his vote of thanks—namely, that nearly all present had learned something, and those who had not learned, had certainly found food for thought.

House Organs

Nickel Bulletin, January, 1958; published by the Mond Nickel Company, Limited, Thames House, Millbank, London, S.W.1.

A major portion of the *Nickel Bulletin* for January is devoted to papers dealing with materials for use in high-temperature engineering. The abstracts include reference to papers on the mechanical properties of aircraft materials at elevated temperatures. Practical applications of high-temperature alloys in this field are described in a survey of uses in some recently developed aircraft gas-turbine units. Items of interest in relation to the atomic-energy industry include papers on the influence of irradiation on the properties of stainless steels and high-nickel alloys. Further items are concerned with uses of nickel-containing alloys in paper-making plant and the analysis of stainless steels.

Staveley News, Vol. 7, No. 1; issued by the Staveley Iron and Chemical Company, Limited, near Chesterfield.

This is a genuine house organ, as distinct from company magazines which cover all sorts of external activities. However, it does carry one article covering the work carried out in a department; though even this should make interesting reading for the rest of the staff. In this issue there is an article dealing with the making of cast-iron pipe-specials; the rest of the contents deals with the activities of the staff and moreover does it very well.

Electricity in Industry, No. 14; issued by the Lancashire Dynamo group of companies, St. Stephen's House, Victoria Embankment, London, S.W.1. This issue contains four main articles. These are concerned with recent developments in the field of variable speed drives, rolling bearings for small motors, vehicle battery charging and transformer core steel. The latter article is one of a series which, in this issue, covers methods of use and processing of high-grade transformer core steel.

THOMPSON BROS. (BILSTON), LIMITED—Mr. A. E. P. Turner has resigned as secretary and as a director. He is succeeded as secretary by Mr. A. W. Wagstaff.

New Sand Plant for Stothert & Pitt, Limited

Installation of Integrated Handling System

Stothert & Pitt, Limited, the well-known firm of crane manufacturers and engineers of Bath, Somerset, recently increased their potential output of castings by the completion of a new jobbing foundry, incorporating a mechanical handling system for the moulding sand. Sand is received from the knock-out area and elevated by means of a 24-in. wide troughed-belt conveyor, fitted with

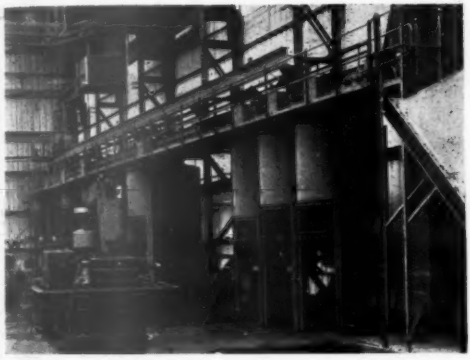


FIG. 1.—*General view of the foundry sand plant at Stothert & Pitt, Limited, showing the elevator (right), distribution conveyor, and facing and backing-sand hoppers.*

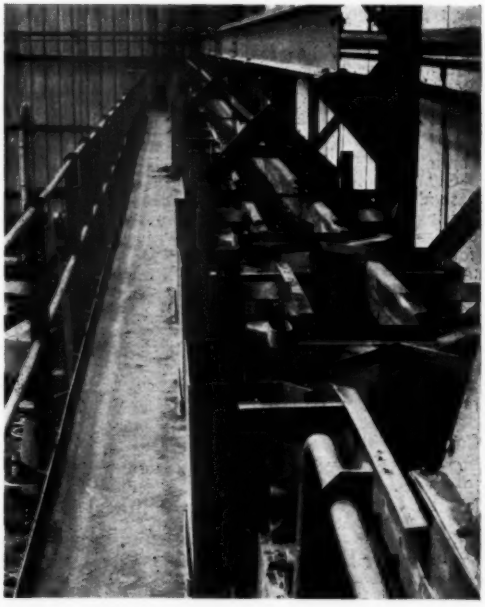
an Overband magnetic separator, to a disintegrator discharging to a 10-in. vertical belt-and-bucket elevator, 31 ft. long. The latter delivers the sand at a rate of 20 tons per hour to a "Sherwen" electro-magnetic single-deck vibrating screen, having a screen cloth of $\frac{5}{16}$-in. mesh. The throughput from the screen falls into an elevated circular bunker of 20-tons storage capacity and rejected material is transferred by chute to the floor for return to the disintegrator.

Mill

Sand is drawn from the storage bunker by a 6-ft. 6-in. dia. rotary feed-table into a skip hoist, a measured quantity of new sand being added to each skip load before it is elevated to the mill. The hoist delivers sand at the rate of 15 tons per hour to an "August" 2F mixer where water is added to provide the required consistency for moulding purposes. The prepared sand from the mixer passes to a belt feeder and then again to a 10-in. vertical belt-and-bucket elevator 23 ft. long which takes it to the distributing conveyor above the moulding machines. The distributing conveyor is an 18-in. wide flat belt, 100 ft. long, and supplies the sand through six hinged ploughs and one fixed plough to the storage hoppers below. Situated close to the feed point are two 5-ton capacity hoppers for backing sand, and one 3-ton hopper for facing sand, each being circular in design with cone-shaped bottom and duplex gate, and discharging into skips. Midway along the distributing conveyor is a 5-ton capacity circular hopper feeding a Sandslinger. Close to the driving end of this conveyor are three one-ton capacity circular hoppers, also with coned bottoms and duplex gates, which deliver sand to three "Osborne" moulding machines. The hinged ploughs are "V"-shaped and hand-operated from a platform running alongside the distributing conveyor.

For this integrated handling system, the distributing conveyor, screen, elevators, hoppers, bunker and rotary feed table, together with supporting steelwork and platforms, were supplied by the New Conveyor Company, Limited, and Stothert & Pitt, Limited, supplied the remainder of the plant, utilizing some surplus equipment from the main foundry.

FIG. 2.—*Section of the distribution conveyor and platform alongside. It comprises an 18-in. flat belt and hinged ploughs, operated from the platform, serve to direct sand into the hopper selected.*



American Letter

Meetings on Foundry Products

Committees of the American Society for Testing Materials have been holding meetings on foundry products in the January 15 to February 15 interval. Committee A-3 on cast iron met on February 13 and 14 to discuss the problem of developing a short test-bar not exceeding 8-in. long made in A, B and C diameters which are approximately $\frac{7}{8}$ in., $1\frac{1}{4}$ in. and 2 in. respectively. The 1.25 or B bar is expected to remain as a primary choice. Tensile properties are expected to govern acceptance and classification will remain in the No. 20 to 60 grades conforming to those now in use.

Specifications or recommended practices for grey iron for low-temperature service have been outlined and further discussions toward their final preparation are in progress. Six grades of austenitic grey iron have been tentatively proposed and further work on them is progressing. They include compositions containing nickel contents of 13.5 to 36 per cent., chromium up to 6 per cent., copper up to 7.5 per cent., carbon in the range of 2.4 to 3.0 per cent. and silicon in the range of 1 to 6 per cent.

In the case of spheroidal-graphite irons, some amendments to existing specifications were proposed. These included inspection, details involving the attachment of a small test-lug to each casting of appreciable size. Such test-lugs were to be broken off and qualified for toughness or brittleness. This additional shop test was intended to supplement specification composition and hardness ranges now set forth in existing s.-g. iron specifications. Proposals were received to develop austenitic s.-g. iron specifications and also specifications for low-temperature applications of s.-g. irons. Some interest is developing in specifications for valves and fittings of s.-g. iron. Minor changes in specifications for automotive engine and brake-drum castings were dealt with and similar minor changes in chill-test control methods were discussed. No agreement could be reached on a proposed chill test for white irons. The project of developing specifications for abrasion-resisting irons in this family, including the chromium and nickel-chrome alloyed types was proposed. Reports on activities dealing with the classification of microstructures and suitable nomenclature were made by committee spokesmen. There was no important change in the specifications under the supervision of committee A-7 on malleable iron.

Committees working on brass- bronze- and copper-base alloy castings reported upon existing specifications for ingot and castings to the extent that some standardization in impurity limits is in process for existing copper-base alloys. Silicon-bronze and silion-brass are to be added to the general specifications.

New activities were undertaken to the extent of recommending the development of specifications for castings, ingot and shot of cupro-nickel including weldable grades in the composition range of 70 copper: 30 nickel and 90 copper: 10 nickel. Sub-committees charged with these responsibilities were instructed to report at the next meeting.

Capacities of Steel-producing Furnaces

Capacities of steel-producing furnaces on January 1, 1958, are reported by the American Iron and Steel Institute to total 140,700,000 net tons. The figure given for the corresponding date in 1957 was 133,500,000 net tons and in January 1, 1945 it was 95,500,000. The post-war increase in total capacity is recorded as 47 per cent.

AFS Awards

The American Foundrymen's Society have announced that Mr. Ralph A. Clark, manager of foundry service, Electro Metallurgical Company, Division of Union Carbide & Carbon Company, Cleveland, will receive the Thomas W. Pangborn gold medal of the AFS for outstanding contributions to the Society and to the ferrous castings industry, especially in the field of grey iron metallurgy.

Mr. Howard J. Rowe, chief metallurgist, castings division, Aluminium Company of America, Pittsburgh, the William H. McFadden gold medal of the AFS for outstanding contributions to the Society and to the light metals branch of the castings industry. Mr. William W. Maloney, general manager and secretary-treasurer, American Foundrymen's Society, Des Plaines, Illinois, the Joseph S. Seaman gold medal. The awards will be made in Cleveland as part of the programme of the 62nd AFS Castings Congress and the AFS Foundry Show which will be held on May 19 to 23.

Foreign Economic Reports

The following extracts have been prepared from recent economic reports emanating from the Export Services Branch of the Board of Trade. In each case an attempt is made to include mention of trends which may influence foundry business.

Sweden: Although the supply of iron and steel to the Swedish market during the third quarter of 1957 fell to a level corresponding to current consumption it appears likely that for the year as a whole stocks on hand may be 100,000 tons greater than in 1956, mainly on account of the substantial rise in domestic production and the high level of imports at the beginning of the year. The Swedish iron and steel market has latterly been affected by the falling demand on the continent and has been under pressure from persistent export offers from continental producers at prices well below the cartel's official quotations. Swedish wholesalers and producers have been compelled to make corresponding price reductions, particularly in respect of girder iron and reinforcement iron. The share capital of Sandvikens Ironworks is to be increased by about £1,600,000 to approximately £6,400,000 mainly for the purpose of expanding the production of tungsten carbide at the company's Vastberga works near Stockholm.

Lebanon: Political disturbances in neighbouring countries do not appear to have had much effect on the Lebanese economy and, by and large, trading conditions have been reasonably good. Bills are being paid promptly and banks are quite prepared to discount bills at six months maturity. A mill for the production of steel from scrap is being established in Tripoli and it is hoped that production will start in August of this year. The plant and machinery is being supplied by Western Germany.

Nigeria: Some concern is being felt about the restrictions recently imposed on the export of tin by the International Tin Council, as a result of which more than 5,000 mine workers, including 40 Europeans, on the Plateau minefields in Jos have been laid off. The restrictions initially cover the period up to March 14, 1958, during which Nigeria may export only 1,442 tons of ore. This is less than the exports for one good month. If the control is maintained it will mean that Nigeria will be able to export only 5,768 tons for a whole year, as against over 13,000 tons in a good year.

Instantaneous Gas Measuring Instruments

Four industrial instruments new to Britain were demonstrated by Winston Electronics, Limited, Shepperton (Middx.) by Dr. H. Righi, of Beckman Instruments, Inc., recently. They were:—The Beckman industrial gas chromatograph, the Liston-Becker infra-red analyser, the Beckman leak detector, and the Beckman electrolytic hygrometer.

In spite of its name, gas chromatography has nothing to do with colour, but is a process evolved from liquid chromatography in which colour comparisons are made. The Union Carbide & Carbon Corporation, US, developed it in 1954 for monitoring chlorine gas of 95 to 97 per cent. Cl_2 within 0.25 per cent., so as to ensure that the chlorine acquired from the seller was of at least equal value to that paid for. The prototype industrial gas chromatograph has now been in use for two and a half years, and about 70 such instruments are in use. The patent is now used by Beckmans. The principle, suitable also for estimating hydrocarbons and other gases, is that the thermal conductivity of the gas is converted into an electrical signal. One thermistor sensing cell carries a sample of neutral reference gas, and a second thermistor sensing cell is subjected to the gas sample to be estimated, each cell forming one arm of a Wheatstone's bridge.

Infra-red Analyser

The Liston-Becker infra-red analyser, like the gas chromatograph, gives instantaneous readings, and is suitable, particularly for measuring CO or SO_2 in parts per million, of CO and CO_2 from 0 to 50 p.p.m. in NH_3 synthesis gas, of CO and CO_2 in flue gas, and of residual CH_4 in CH_4 reformed to hydrogen. It is also used for CO_2 analysis in animal respiration.

The Beckman helium leak detector is a mass spectrometer operated by radio-frequency current, not by the magnetic principle of the usual mass spectrometer. A small amount of helium is injected into the vessel in question and a probe is passed over the welds, joints, or other suspected leaks. It is claimed that it will detect leaks which can be found by no other means; in fact, that it will detect one part of helium in 700,000, and can measure leaks of 1×10^{-22} litres per sec.

The Beckman electrolytic hygrometer is a simpler instrument, for batch measurement or for continuous monitoring of water content from 0 to 1,000 p.p.m. in gas or vapour samples, at temperatures up to 100 deg. C. Higher concentrations of water can be measured by dilution techniques. Analyses are made by continuously absorbing and electrolyzing all the water present in a sample stream. An alarm system can be set up for any point in the instrument's range. Winston Electronics, Limited, is the British agent for these industrial instruments. Baird & Tatlock, Limited, is agent for laboratory instruments, mainly medical, also made by Beckman Instruments.

Ornithology and the Founder's Art

By C. J. Robb

Ornithology has played an important part in the history of ornament and decorative design. In this connection the founder has been called in to produce in metal various forms of bird life. The first feathered friend cast in copper is said to have been the raven in the ancient city of Ur in the days of King Ur Nammu *circa* 2100 B.C. The Romans cast their military eagles in sharp and pleasing outline. In the ornate world of cast iron in 16th century England, birds appear in the design of cast firebacks, the dove being a favourite and the rooster had his place too. Swan fire dogs were in evidence in the 1660's and storks appeared on firebacks in the same period. The use of cast iron for weathercocks is rare and limited. One of these lofty fowls, a reminder of St. Peter's weakness of the flesh was cast in 1720 for the steeple of the Corporation Church of Belfast, Ireland. It was cast in two halves and weighed 56 lb. In the under body of the bird, a ring bearing of wrought iron was fixed which rested on a boss to the spindle, but the cock was not too sensitive to the wind. Cast-iron birds to represent eagles, doves, storks, herons, etc., were common pillar terminals to the entrance gates of the seats of the nobility and gentry in the last and previous centuries and were striking heraldic ornaments. Cast fowls appeared on inn signs and a great turkey-cock projected over one door in Dublin. Umbrella stands were made as storks with a loop worm in their mouths to hold the weather shades in an upright position. Church lecterns in some instances were made in ornithological cast iron in the form of eagles and pelicans. Thus has the bird world been reproduced by the founder.

UK Agricultural Machinery's Lead over Germany

Agricultural engineering in the UK is increasing its export lead over Germany—especially in the tractor field. The Agricultural Engineers' Association announces that British tractor exports in the first nine months of last year were worth £48,598,145 and German tractor exports over the same period amounted to £17,804,800. The corresponding figures for 1956 were:—UK, £37,564,274; Germany, £22,535,600. With ever-rising costs and prices of German machinery there is every indication that the British lead will be maintained throughout 1958.

The general trend of exports shows substantial gains as follows (1956 figures in parentheses):—France, £1,601,754 (£1,197,728;) Eire, £1,358,723 (£1,336,670); New Zealand, £1,179,379 (£943,746); Yugoslavia, £1,175,401 (£388,675); USA, £475,835 (£443,737); Sweden, £333,062 (£319,320); Belgium, £298,431 (£249,630); Italy, £272,728 (£187,108).

New Group for Automation

The Institution of Mechanical Engineers announces the formation of a new organization, to be known as the British Conference on Automation and Computation, to facilitate the exchange of information regarding the activities of the individual societies within the field of automation. It is composed of three groups as follow:—

A—British Group for the Engineering Applications of Automation; B—British Group for Computation and Automatic Control; and C—British Group for the Sociological and Economic Aspects of Automation Techniques.

At a meeting held on February 20, group (A) was formally constituted, and, at present, the following societies have associated themselves with the group:—Institution of Mechanical Engineers; Institution of Civil Engineers; Institution of Electrical Engineers; Institution of Chemical Engineers; Institution of Production Engineers; Incorporated Plant Engineers; Institute of Fuel; Institute of Marine Engineers; Institute of Materials Handling; Institute of Metals; Institute of Welding; Institution of Engineering Inspection; Institution of Gas Engineers; Institution of Mining Engineers; Institution of Municipal Engineers; Institution of the Rubber Industry; Institution of Structural Engineers; Iron and Steel Institute; Plastics Institute; Royal Aeronautical Society; and Society of Instrument Technology.

The objective of the group is to foster the development of the engineering applications of automation in its widest sense.

Constitution

Dr. D. F. Galloway, PH.D., B.SC.(ENG.) (LOND.), WH.SCH., a member of Council of the Institution of Mechanical Engineers, was elected chairman of the group, with Mr. J. S. Brough, A.M.C.T., M.I.MECH.E., M.I.CHEM.E., and Sir Walter Puckey, M.I.PROD.E., F.I.I.A., (past-president of the Institution of Production Engineers) as vice-chairmen. Mr. Brian G. Robbins, M.SC.(ENG.), F.C.G.I., M.I.MECH.E. (secretary of the Institution of Mechanical Engineers) was elected honorary secretary of the group and the offer of the Institution of Mechanical Engineers to provide secretarial services for the group was accepted. The British Group for Computation and Automatic Control—group B—was formally constituted on December 20, 1957.

At the meeting of the Engineering Applications Group held on February 20, it was agreed that a symposium on "Instrumentation and Computation in Process Development and Plant Design" which is being planned jointly by the Institution of Chemical Engineers, the Society of Instrument Technology and the British Computer Society, should be held under the ægis of the BCAC, subject to the agreement of group B. Among other points discussed were the possibility of group participation in the Fourth International Exposition and Congress on Automation in New York during June, 1958, relations with the International Federation of Automatic Control and other international organizations of interest, the publication of a *Bulletin*, and the need for a bibliography.

The constitution of the Engineering Applications Group provides for the election of additional member societies of the type listed above. Applications for membership should be sent to the honorary secretary, BCAC, Group A, 1, Birdcage Walk, Westminster, London, S.W.1.

Company News

STAVELEY COAL & IRON COMPANY, LIMITED—The interim dividend of this holding company is reduced by 1 per cent. to 3 per cent. for the year to June 30, 1958. A final of 10 per cent. made a total of 14½ per cent. for 1956-57.

GENERAL REFRACTORIES, LIMITED—Group profits during 1957 amounted to £1,158,738, compared with £902,103 in the previous year, and the dividend is raised from 17½ per cent. to 20 per cent. Deducting all charges—including depreciation £267,092 (£218,065) and tax £470,203 (£346,254)—the net profit amounts to £382,840 (£300,579). General reserve receives £66,372 more at £191,372.

ALFRED HERBERT, LIMITED—For the last several months orders have been lower than output and the backlog has been considerably reduced, but prospects are sufficiently encouraging to warrant the payment of the increased dividend, the directors state. The dividend on the £5,461,875 ordinary capital is being raised from 7½ per cent. to 12 per cent., tax free, for the year to October 31, 1957, with a final of 8 per cent., against 5 per cent. Trading profit has expanded from £3,480,117 to £3,666,922 and, after taxation of £2,064,263, against £1,781,422, the net profit is up slightly from £1,797,782 to £1,821,311.

DOWTY GROUP, LIMITED—An estimated profit, after tax, of £475,000 for the six months to September 30, 1957, is shown in the first half-yearly statement of the company. Figures available show that the improvement is continuing and the directors add that they believe the final result for the year to March 31 next will show an increase of some 25 per cent. over last year's figures. With a satisfactory order-book and the directors foreseeing a further increase in turnover in 1958-59, the interim dividend on the £2,400,000 capital is raised from 4 per cent. to 5 per cent., tax free. A 5 per cent. final made a 9 per cent. net total for 1956-57.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

ROTHWELL, YORKS, March 11—Supply of the following for year ending March 31, 1959, for UDC:—various cast-iron manhole covers and frames; gully grates and frames. Documents from the Engineer and Surveyor, Civic Buildings, Rothwell, near Leeds.

EDINBURGH, March 19—Supply of special pipe castings, sluice valves, etc., for a period of 12 months from May 16, 1958, for City Council. Documents from the City Water Engineer, 6, Cockburn Street, Edinburgh.

ABERCARN, MON, March 18—Supply of the following to UDC for 12 months commencing April 1, 1958:—gully grates and frames; ironmongery. Documents from the Surveyor, Council Offices, Abercarn.

BURMA, March 17—Geared crane ladle. (ESB/5874/58.)

U.S.A.—The Freeman Supply Company, Toledo, Ohio, have advised the British Consulate-General at Cleveland that they are interested in obtaining United Kingdom sources of supply for the following handled patternmakers tools:—Paring gauges; paring bevelled chisels; straight shank and bent shank, in a full range of sizes. (ESB/5587/58.)

KOREA, March 28—Requirements include pump, three-stage turbine with electric motor drive, pumps, flexible coupling, etc. (ESB/5963/58/ICA.)

U.S.A.—Toledo Marine Terminals, Incorporated, 26 Main Street (rear), Toledo, Ohio, who have expressed interest in importing, for their own uses, fork-lift trucks. The firm would also consider an agency proposition for a line of lift trucks suitable for use in warehousing and ship loading. (ESB/5498/58.)

News in Brief

METROPOLITAN-VICKERS ELECTRICAL COMPANY, LIMITED, announce that from Monday, March 24, the address of the company's Sheffield district office will be 9, Market Place, Sheffield, 1.

THE 350 ACRES OF LAND surrounding the works of Newton Chambers & Company, Limited, at Thorncliffe near Sheffield, are to be improved by a plantation scheme which has been decided upon after talks with the Forestry Commission.

THE DAIMLER MOTOR COMPANY is presenting to Coventry City Council Museum and Art Gallery the 1898 car of the first type that the company produced. It is a 6 h.p. chain-driven vehicle which was once capable of reaching a speed of 20 m.p.h.

MEMBERS OF THE STAFFORD BRANCH of the Purchasing Officers' Association made a tour of the Shelton Iron, Steel and Coal Company, Limited's works at Stoke-on-Trent, on March 3, at the invitation of the Hon. V. H. O. Herbert, a director of the company.

A NEW OFFICE at 22, St. Mary Street, Cardiff (telephone: Cardiff 26648), has been opened by International Combustion, Limited, London, W.C.1. The new office, which also represents International Combustion (Products), Limited, is under the control of Mr. R. W. Allison.

RUSTON & HORNSBY, LIMITED, Lincoln, is to collaborate with the civil engineering firm of J. L. Kier & Company, Limited, in the design and development of nuclear power stations with 5-25 mw capacity. It is hoped to build the power stations in underdeveloped countries.

UDDEHOLM, LIMITED, the British Associates of Uddeholms AB, of Sweden, have appointed Mr. S. A. Comley as London-area manager, tool-steel division, to operate from 6-10, Dean Farrar Street, Westminster, London, S.W.1. His position in Birmingham will be taken by Mr. A. G. Shaw.

FORECASTING THAT Canadian iron and steel output would reach 20,000,000 tons—over three times the present annual output—by 1980, Mr. Patrick E. Cavanagh, an official of the Ontario Research Federation, added: "The only thing that can stop us evolving in this direction will be our own timidity or stupidity."

TWO COMPANIES, Richardsons Westgarth & Company, Limited, and the South Durham Steel and Iron Company, Limited, which are expanding in West Hartlepool, are to have 700 houses built exclusively for their workers during the next six years by the West Hartlepool Housing Committee. The tenants will be chosen by the firms and pay full economic rents.

A CONSIGNMENT of direct-injection six-cylinder diesel engines is being shipped to Canada by Leyland Motors, Limited, for use as power units in the "Canada" trucks produced by Canadian Car Company, Limited, of Montreal. The current order covers 100 diesel engines, rated at 175 b.h.p. at 2,200 r.p.m. with a torque of 495 lb./ft. at 1,100 r.p.m.

INSTRUMENTATION FOR IRON AND STEEL, and instrumentation in the petrochemical industry will be reviewed at the Instruments, Electronics & Automation Exhibition, Grand Hall, Olympia, London. April 16-25. by Mr. B. O. Smith, M.SC., British Iron & Steel Research Association, London, S.W.11, and S. W. J. Wallis, British Petroleum Company, Limited, respectively.

THE Council of Senate at Cambridge University has recommended the establishment of a Sir George Nelson prize in applied mechanics, made possible by the offer of £500 by the English Electric Company, Limited. The prize would be awarded to the candidate who aquitted himself with the greatest distinction in applied mechanics in part two of the mechanical sciences tripos.

AT A RECENT MEETING in Dublin it was decided by representatives of welding, foundry and engineering firms and organizations to form an Irish Welding Association. The objective will be to co-ordinate standards of quality, inspection and testing. Support has been promised by the Eire Minister for Industry and Commerce and the British Welding Research Association.

SHEFFIELD HAULAGE FIRMS, and industrialists generally, will welcome the news that the West Riding County Council hope to provide in next year's estimates for modern equipment to prevent vehicles from becoming snowbound on the Woodhead Pass. This year, as on previous occasions, the line of halted vehicles has stretched for miles. Haulage contractors have protested about the conditions for over 30 years.

MR. A. BOYES, director of the East Sussex Engineering Company, Limited, addressing the Lewes Chamber of Commerce, said that all Brighton's balustrades and lamp standards, and its piers and railway station were cast at Lewes. Mr. Boyes was tracing the history of his company, which originated when Mr. John Every walked from Grantham to Lewes about 1820 to work in a Lewes foundry.

A SITE on the town's main thoroughfare is to be set aside by Greenock Town Council for a new technical college planned by Renfrewshire Education Committee. The new college, which will specialize in electronics, is expected to cost about £750,000. An American firm, I.B.M. Limited, have declared their interest in the project as their principal product is electronic machines. The line of co-operation between the firm and the Education Committee has still to be discussed.

AN INTERNATIONAL SALES CONFERENCE, organized by Steels Engineering Products, Limited, designers and manufacturers of Coles mobile cranes, Sunderland, is to be held at the Royal Hotel, Scarborough, from April 27 to May 3. The programme will include films and demonstrations of the company's equipment, lectures on materials handling, crane-selling techniques and future trends in design. A number of overseas delegates will speak on the sales methods and techniques adopted in their own countries.

IT IS REPORTED THAT Ghana has banned the export of scrap iron which was previously allowed under licence. Work is proceeding on the installation of a pilot plant in the new foundry and rolling mill to be established at Abosso near Tarkwa. It is hoped that the mill will make a substantial contribution towards the needs of the building and certain metal industries. It is also reported that the Ghana Government proposes to make an order declaring the manufacture of foundry products a pioneer industry for the purpose of income tax.

WITHIN TWO WEEKS of placing a £250,000 bus order with the Leyland Motors group, the Ceylon Transport Board has now contracted a £400,000 order with the group for additional buses and bus bodies. The new contract covers 80 Aberdonian underfloor-engined complete buses, and 20 bodies for Aberdonian chassis previously ordered. Produced by Albion Motors,

News in Brief

Limited, the Aberdonian model has a low fuel consumption, weighs only 57¼ cwt., and yet is suitable for a 30-ft. long body. Metropolitan-Cammell-Weymann are to supply all the bodies.

WHATLINGS, LIMITED, civil engineering contractors, Glasgow, have received the first civil engineering contract, valued at over £1,000,000, for the Central Electricity Board's hydro-electric project at Rheidol in Wales. The work comprises the construction of five miles of tunnel, which will pass through an area of worked-out lead mines, and the building of a dam 320-ft. long and 75-ft. high, with ancillary intake works, including a road diversion. During the period of the contract other contracts within the main project will start, and the whole scheme will, it is claimed, be in operation in 1961.

THE SHAREHOLDERS OF CANADIAN MINES, LIMITED, have been informed that it is now within reason to anticipate 1,000,000 tons of recoverable copper ore around the Mountain Mine workings in County Cork. Investigations prove that former operators (about 75 years ago) left a considerable amount of ore in the mine mainly because they lacked modern exploration equipment, and the mine was not to be "bottomed" at 1,800 ft. The report also reveals that the ore in the Allihies area lends itself to selective mining, permitting the management to cope with downward fluctuations in the price of copper, such as now prevail.

THOS. W. WARD, LIMITED, Albion Works, Sheffield, presented a petition for the compulsory winding up of Project Mayflower, Limited, on March 3. The firm is judgment creditor for £547. The petition was adjourned for a month. Mr. Bryan Clauson, for Thos. W. Ward, Limited, said creditors with debts totalling £60,000, opposed the petition. He understood that certain money might be forthcoming from the United States and he would not oppose an adjournment to see if any money became available. The company was not legally represented. Mr. Clauson added that at the present moment the voyage had been financed by a large number of creditors, including his clients—the company which built the boat.

UNDER THE STATE GUARANTEES ACT, permitting the Eire Government to guarantee borrowings for certain undertakings for various developments, the St. Patrick's Copper Mines, Limited—a subsidiary of the Mogul Mining Corporation of Toronto—is to repay £500,000 to the Eire Government for the cost of previous exploration work which had revealed the existence of 12,000,000 tons of ore. It is reported that production of copper ore at the Avoca mines is not likely to be affected by the decision of the world's major copper-mining companies to cut output this year by 10 per cent.—a decision taken because of the continuing fall in world copper prices. A spokesman at the Avoca mines has affirmed that production is expanding there and there is no question of cutting down on output. Employment has concurrently increased to 450 miners and this figure is likely to be stepped up further when the plant for concentrating the ore is completed in July.

AN OFFER by Samuel Fox & Company, Limited, steel manufacturers, of a gift of £112,000 towards the cost of 500 houses, needed for employees in connection with the expansion of their works, was accepted by Stocksbridge Urban Council on February 27. The offer was originally made over a year ago but because of the increase in interest rate the Council had been trying to obtain more favourable terms. They had invited the firm to pay five per cent. of the loan charges, or guarantee the rent, during the period of the loans, of any of the first instalment of 250 houses which may become vacant or could not be re-let. But Mr. P. H. Forder, general manager of Samuel Fox, had replied that the offer was the limit of the firm's financial participation in the scheme. The firm's offer was accepted with the signing of the agreement subject to the Council having the right to postpone building until such time as the Public Works Loan Board's interest rate is reduced to a reasonable figure.

AT A MEETING IN BIRMINGHAM, on February 28, organized by the Federation of British Industries and the Birmingham Chamber of Commerce, Sir John Balfour, the UK Commissioner-General for the Brussels International Exhibition which opens in April, told Midland industrialists that the event presented an opportunity for British industry to show its products. This huge "shop window" was especially important in view of plans for a European common market he said. The exhibition would be an enormous clearing house for the exchange of ideas, and people from all walks of life could find something to interest them there. "It is a sort of 20th century stocktaking" Sir John said. "People asked what Britain was to get out of the exhibition. Those who wished to be cynical could say that Belgium could make a lot of money out of it. For Britain, however, there was the prestige value and a great advertising opportunity because thousands of prospective buyers will be there."

IN A SPEECH devoted to the impact of the European Free Trade on the motor industry, Mr. K. D. Bull, head of marketing analysis at the Ford Motor Company, Limited, told delegates at the British Institute of Management conference held at Leamington on March 7, that the most rapidly expanding market outside the United States was Western Europe. The success of the British motor-car industry in breaking further into European markets would not be assessed from the viewpoint of the industry as a whole but from the success of individual firms. Mr. Bull suggested that it was dangerously naïve to argue that because a car was small it must be cheap and thus must sell well, especially when incomes in Western Europe were going upwards. Mr. F. Garner, deputy managing director of Joseph Lucas, Limited, Birmingham, speaking on manufacturing problems in the free trade scheme said that Britain must ensure that research and development in industry were encouraged to the utmost so that new or improved products could be introduced and stagnation avoided. Dr. T. U. Mathew, a director of Round Oak Steelworks, Limited, Brierley Hill, who also addressed delegates, said that the free trade area with a population of 250,000,000 would create great opportunities for Midland industries, and that large groups should be able to double their markets within 10 to 15 years while smaller, specialized companies might find their markets 20 times greater. Mr. John Pinder, economic expert, stated that the average British worker produces and earns about 10 per cent. more than his German counterpart. Referring to German competition in the proposed European Free Trade Area, he said that the Germans were liable to catch us up on production and probably on wage rates too. Costs and prices should, therefore, tend to be about equal but there was a great potential danger unless we in this country increased investment. An excellent reason for investing abroad was to set up a selling network.

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Exhibition Briefs

Physical Society

The 42nd annual exhibition of the Physical Society will be held on March 24 to 27 at the Royal Horticultural Society's Halls, Westminster, London. Opening times are as follows:—March 24, 10.30 a.m. to 2.0 p.m. (press and members only), 2.0 p.m. to 7.0 p.m.; March 25, 10 a.m. to 9.0 p.m.; March 26, 10.0 a.m. to 7.0 p.m.; March 27, 10.0 a.m. to 4.30 p.m. Exhibitors include the following firms.

CAMBRIDGE INSTRUMENT COMPANY, LIMITED, of Grosvenor Place, London, will be exhibiting an electronic conductivity recorder, a direct-writing, continuous-running and mains operated instrument of high sensitivity with built-in amplifier.

GRIFFIN & GEORGE, LIMITED, of Wembley, Middlesex, will be exhibiting two pieces of equipment, their VPC Apparatus Mk II for the analysis at reduced pressures of mixtures having components with boiling points up to 350 deg. C. at atmospheric pressure, and their isothermal bomb calorimeter.

EDWARDS HIGH VACUUM, LIMITED, of Crawley, Sussex, will show a range of new equipment among which will be a vacuum-fusion gas-extraction and analysis apparatus. This is a completely self-contained unit for the vacuum extraction and analysis of gases in metal samples. Also on display is an improved version of the "Telegas" instrument for the determination and control of hydrogen in aluminium.

THE MORGAN CRUCIBLE COMPANY, LIMITED, of Battersea, London, will exhibit a number of instruments. Among these will be their silicon carbide-graphite thermocouple, which consists of an inner graphite rod cemented into an outer silicon-carbide tube, approximate dimensions ¼-in. dia. by 12-in. long. Also on show will be the H.F. Titrimeter used for the detection of end-points in solution where visual indicators cannot be used or give unsatisfactory end-points.

Electrical Engineers

The Electrical Engineers Exhibition will open at Earl's Court on Tuesday, March 25 to 29 (March 25, 27 and 29, 10.0 a.m. to 7.0 p.m.; March 26, 7.0 a.m. to 9.0 p.m.), and among the many exhibitors the following will be of interest to the foundry trade.

HEDIN, LIMITED, of South Woodford, London, will exhibit (*Stand No. F.10*) a range of industrial heating equipment comprising heating elements, panel heater, furnaces, ovens, and a humidity cabinet.

HENRY WIGGIN & COMPANY, LIMITED, Wiggin Street, Birmingham (*Stand H.2*), will exhibit nickel/chromium electrical-resistance materials in industrial heating equipment, and the nickel/copper alloy Ferry in load-regulator resistances for diesel-electric traction.

SUFFOLK IRON FOUNDRY (1920) LIMITED, of Stowmarket, will demonstrate (*Stand No. T.23*) the use of Sifbronze rings with "Stanelco" automatic-flame brazing equipment. Also on show will be the "Demon" cutting blowpipe, which has a cutting range of 10-in.

PHILIPS ELECTRICAL, LIMITED, of London (*Stand K.14*) will exhibit a ballast with a "Polyester" resin filling. The use of this material has, it is claimed, resulted in considerable reduction of choke size and, thus, a saving in weight. Also on display will be a range of mercury fluorescent lamps, tungsten lamps, lighting fittings and research and control instruments.

AERO RESEARCH LIMITED, manufacturers of "Araldite" epoxy resins, of Duxford, Cambridge, will exhibit some of the uses of these resins. The interest to the heavy electrical industry will be gravity-casting resins for transformers and insulators. A large selection of potted components, with resistance to chemical attack and tropical conditions, will also be on display.

LANCASHIRE DYNAMO NEVELIN, LIMITED, St. Stephen's House, Victoria Embankment, London, will exhibit (*Stand D.5*) a direct-to-mains Varionic variable-speed drive incorporating a steel-tube Nevitron single-anode rectifier. Also on show will be a monitored earth-safety unit which has been developed to safeguard the operator when using portable equipment from the mains.

THE BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION (*Stand C.4*) will stage a display on the theme "Light, a tool of production." Exhibits will include the stroboscopic lamp, which enables rapidly-moving machines or parts of machines to be examined in motion. Among other electrical aids to production on show will be a device for the inspection of surface flatness, a fluorescent crack detector for the examination of highly-stressed castings and a device for the inspection of journals or bearings.

TURNERS ASBESTOS CEMENT COMPANY, LIMITED, of Trafford Park, Manchester (*Stand U.9*) will show examples of the application of "Siluminite" phenolic and melamine resin bonded asbestos paper, felt or fabric laminates. New products to be exhibited are laminates black-dyed throughout and melamine-faced phenolic asbestos laminates.

Also on exhibition will be silicone resin-impregnated natural "Sindanyo" boards and parts and "Siluminite" silicone resin-bonded laminates together with silicone impregnated asbestos papers, tubes and cylinders.

Other products in their standard range are electrical grade asbestos papers, paper tapes and tubes and sections for such uses as interturn insulation on edge-wound field coils, bi-metal covers on thermal relays, and wire covers in rewireable fuses.

Forthcoming Events

MARCH 17

Institute of Vitreous Enamellers

Midland section: "Function of the Vitreous Enamel Development Council," by M. Hopkins, 7.45 p.m., at the Birmingham Exchange & Engineering Centre, Stephenson Place.

MARCH 18

Institute of British Foundrymen

East Anglian section: "Experiences of Forty Years in and Around Foundries," by W. Hardy, 7.30 p.m., at the Lecture Hall, Public Library, Ipswich.

Slough section: Annual general meeting followed by "Non-destructive Testing of Castings," by S. L. Fry, 7.30 p.m., at the Lecture Theatre, High Duty Alloys, Limited.

MARCH 19

Combustion Engineering Association

Northern region: Brains Trust on "Space Heating and Insulation," 11 a.m., at the Grand Hotel, Sheffield.

MARCH 20

Southampton Metallurgical Society

"Stress Corrosion," by K. Wilson, 7.15 p.m., at the Southampton University.

Institution of Production Engineers

Southampton section: "Piston Rings and Liners," by Mr. Bowler, 7.15 p.m., at the Polygon Hotel.

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AP/24

Personal

Mr. T. GRAHAM, of Manchester, has been elected assistant general secretary of the Amalgamated Union of Foundry Workers.

Mr. W. F. WACKRILL, a director of the Esso Petroleum Company, Limited, has retired under the company's retirement plan.

THE DUKE OF RICHMOND AND GORDON and Colonel PETER F. BENTON JONES have been appointed to the board of the British Wagon Company, Limited.

Mr. R. RICHARDSON has joined Berk Exothermics, Limited, as sales and development manager, the appointment dating from March 1.

Mr. W. J. LUXTON, who is leaving his post as secretary of the Birmingham Chamber of Commerce, is to become secretary of the London Chamber of Commerce in succession to Mr. A. DE V. LEIGH, who will retire on September 30 after 35 years' service.

Mr. JOHN ALBERTINI, a chief sales executive of Ruston & Hornsby, Limited, Lincoln, is relinquishing some of his present duties to enable him to give undivided attention to the application of the company's products to nuclear power and the oil industry. He will also be responsible for promoting the sale of Ruston gas turbines in the United States.

Sir KENNETH HAGUE, deputy chairman and managing director of Babcock & Wilcox, Limited, has been elected president of the Engineering & Allied Employers' National Federation, in succession to Mr. F. C. BRABY, chairman and managing director of Frederick Braby & Company, Limited, who has completed his two-year term of office.

Mr. WILLIAM BLACKWELL, president of the Midland Council of the National Union of Manufacturers, retired from that position at the annual general meeting of the Council on March 6. Mr. Blackwell had been chairman of the Council for 10 years and president for the last five. He has now been elected a vice-president. Mr. A. G. B. OWEN, chairman and managing director of the Rubery Owen group, and Mr. GILBERT SALTER, were elected Midland branch president and chairman respectively.

Obituary

Mr. NORVAL ISAACS, cashier to the Staveley Iron and Chemical Company, Limited, Chesterfield, has died at the age of 49. He had been associated with the company all his working life.

The death has occurred at the age of 70 of Mr. ALBERT EDWARD CRASS, head of the firm of A. E. Crass & Sons, thermal insulation engineers, of Middlesbrough, which he founded in 1949.

The death took place on February 26 of Mr. RALPH EWING, chairman of Climax Rock Drill & Engineering Works, Limited, Redruth (Cornwall), and a director of Climax Rock & Equipment Company (Australia) Pty., Limited, and Climax Rock Drills (India), Limited.

The death has occurred in New York of Mr. THOMAS LEACH, who was founder, and, until his retirement some three years ago, president of the Leach Steel Corporation, New York. Mr. Leach was educated at Halifax Technical College and was apprenticed to a Brighouse concern of valve manufacturers before emigrating to Canada in 1910.

Mr. DOUGLAS WOODLIFF, works manager of C. & J. Hampton, Limited, Record Tool Works, Sheffield, died on March 5 at the age of 62. Mr. Woodliff joined the firm at the age of 14 and had been in charge of production for 17 years. He was deputy churchwarden of Grindleford Church for 15 years, and represented the parish of Eyam on the Derby Diocesan Finance Committee.

Mr. DENNIS NEIL WATT, who for the past year had acted as assistant to the secretary of the Joint Iron Council, the Council of Ironfoundry Associations and the Council of Iron Producers, died on March 9, as a result of injuries received in a motor accident. After taking a degree at Cambridge University, Mr. Watt was called to the Bar, joining the Joint Iron Council staff in the spring of last year.

Changes of Name

Among companies which have recently changed their names are those listed below. The new titles are given in parentheses.

EXPERT TOOL HEAT TREATMENTS, LIMITED, 74, Wimpole Street, London, W.1 (Expert Heat Treatments, Limited).

CENTRAL TOOL & EQUIPMENT COMPANY, LIMITED, Centec Works, Hemel Hempstead, Herts (Centec Machine Tools, Limited).

PARKINSON STOVE COMPANY, LIMITED, Terminal House, Grosvenor Gardens, London, S.W.1 (Parkinson Cowan Appliances, Limited).

AUTO NUTS, LIMITED, manufacturers of nuts, screws, and bolts, etc., of Central Parade, Green Street, Enfield, Middx (Swissomatic, Limited).

C.K.W. TUBE BENDING COMPANY, LIMITED, Grange Works, High Street, Chalfont St. Peter, Bucks (King Cole Tube Bending Company, Limited).

LIGHTOWLER & KEIGHLEY, LIMITED, textile machinery manufacturers, etc., of Soho Mills, Thornton Road, Bradford (Lightowler Investments, Limited).

GEORGE NEWEY & COMPANY (TAMWORTH), LIMITED, engineers, etc., of 44, Warstock Road, Kings Heath, Birmingham (Mercian Products (Tamworth), Limited).

STERLING KNITTING COMPANY, LIMITED, precision, electrical, and general engineers, etc., of 12, Clarence Street, Kingston-upon-Thames (Sterling Automation, Limited).

DILLOWAY COMPONENTS, LIMITED, farm and agricultural machinery manufacturers, etc., of 6, Tudor Parade, London Road, Hounslow (P. W. Dilloway (Scotland), Limited).

ASSOCIATED INTERNATIONAL PRESSWORK, LIMITED, mechanical, electrical, and general engineers, etc., of 222, Soho Hill, Handsworth, Birmingham, 19 (Dennison Developments, Limited).

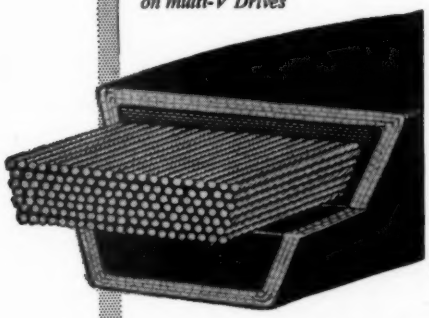
Keighley's Challenge to Swiss-made Looms

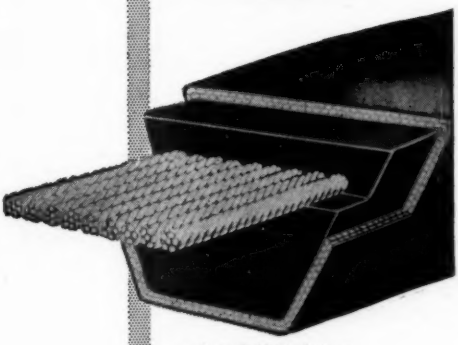
George Hattersley and Sons, Limited, loom makers, North Brook Works, Keighley (recently) demonstrated the latest of the four new looms they have produced since 1956 which make a bid for world supremacy in precision-built automatic looms for weaving high-quality silk and rayon fabrics. The latest model is a single-shuttle loom running at normal production at 200 picks a minute. The looms, developed by the Keighley firm, incorporate many of the best features of established continental makes and cover every weaving requirement from plain to coloured and fancy-woven fabrics. They are all based on the same framing and their parts are interchangeable. An important feature in their design is the total absence of overhead structure or working parts near the cloth itself so as to prevent oil or dirt falling on the fabric during weaving.

BRITISH STEEL CONSTRUCTIONS (BIRMINGHAM), LIMITED—Mr. Robert I. Skeet, Mr. Alfred W. Jeffs, Mr. Basil A. Thomas, and Mr. George M. Bruce have been appointed directors. Mr. A. Van Beugen Bik has resigned from the board. Mr. G. H. E. Howard-Smith has resigned as joint managing director and from the board, but remains with the company as general manager.

V-BELTS THAT ARE BUILT TO LAST!

on multi-V Drives





and on F.H.P. Drives

YOU BUY ENDURANCE when you buy Goodyear V-Belts, made in types and sizes to suit every job from the largest multi-V installations to small F.H.P. drives. Longer belt life, more efficient transmission, less risk of costly shutdowns — these are the positive benefits of making good use of the Goodyear 'job-designed' range of belts which are backed by more than fifty years' experience in rubber engineering.

To be sure of longest, most economical performance it pays to consult Goodyear or your Goodyear Industrial Distributor, who will recommend a suitable belt, and also advise on installation and maintenance.

GOODYEAR

V-Belts · Conveyor Belting · Transmission Belting · Hose · Fenders

THE GOODYEAR TYRE & RUBBER COMPANY (GREAT BRITAIN) LIMITED · WOLVERHAMPTON

Raw Material Markets

Iron and Steel

The supply of pig-iron to the ironfoundries is maintained at a good level and, generally, present outputs satisfy demands. Increased production of the low-phosphorus irons is now enabling some users of this grade to obtain the extra tonnages they need to replace the more expensive irons which necessity has compelled them to use. The demand for the low-phosphorus irons continues on a good scale, and makers are able to dispose of their outputs readily. All other grades of foundry irons, hematite, and refined irons are plentiful. The steelworks are receiving adequate supplies of basic pig-iron and blast-furnace capacity is available to step up production should the necessity arise.

Demands for the high-phosphorus pig-iron continue moderate; there are no signs of any improvement, although it is hoped that seasonal influences will shortly step up demands. Appreciable tonnages from current production continue to be placed into stock by most makers, and enable them to undertake the orders for overseas customers when these can be obtained against the strong competition abroad. No difficulty is experienced in obtaining supplies of hematite pig-iron and refined-iron makers are searching for more orders. Both these grades of iron are available for export and orders continue to be received from buyers overseas.

The motor vehicle trade in particular is keeping many of the engineering and speciality foundries very busy, and from many sources, including engineering, heavy power and electrical, collieries, and steelworks, good demands are forthcoming for high-duty castings, which keep most of these foundries employed on a much better scale than others. The foundries, however, which cater chiefly for the machine-tool trade are not so busy, and demands for castings have fallen appreciably. The light and textile foundries continue their search for more work and many of the jobbing foundries are in a similar position, as productive capacity is nowhere near fully employed.

The re-rollers continue very short of orders for small bars and light sections, with the result that the light mills are working part time and difficulty is experienced in making up rollings for the various sizes and sections. There has also been some falling off in demands for the heavier sizes. In consequence of this, demands for the normal sizes and grades of steel semis are only moderate. Stocks at the re-rollers are fairly good, and orders for billets are placed only when it is necessary to obtain supplies for current consumption requirements. Forward buying is scarce as the minimum of stocks is held. The steelworks have no difficulty in satisfying current needs, and outputs could be increased if the demand warranted.

Non-ferrous Metals

It may be recalled that President Eisenhower designated March as the month in which the decline in the US economy would be halted. The advance on Wall Street and on Throgmorton would appear to support this forecast, but the cold statistics which will affirm or negative this prognostication have yet to be made available. Meanwhile, the rise can be taken as fortuitous *vis-à-vis* the President's statement and pinned to the hope that the bottom of the recession in the US has been reached. This somewhat cheerful, if unsubstantiated, view rests on the belief that stocks of most commodities in the hands of consumers have been run down to near vanishing point and that demand is due to revive. If this is so, positive action will soon be reflected in prices. On the other hand, there is the view expressed by Sir George Bolton, chairman of the Bank of London and South America, that "the world is now moving into a position of abundance, smaller profit margins, and fierce trade competition." Moreover, Sir George feels that, even if world demand picks up strongly, it is unlikely that prices will regain the levels of the past three or four years. Meanwhile, there is no overt evidence that business is picking up to any extent in the US and unless and until the basic indicators such as steel production, car loadings, and automobile sales show a consistent improvement over the weeks ahead, the present improvement will be remembered only as a technical rally. On the other hand, nobody rings a bell when prices have bottomed and it will be interesting to see the extent to which either or both the President and Wall Street are right.

Certainly there has been no sustained cheer for the copper markets in London or in New York. Admittedly, London experienced one or two very good days last week when prices advanced markedly, but the movement has not been sustained. In the US the 2 cent gap between the producers' and custom smelters' price remains, with reports circulating that dealers are selling copper at a price fractionally below the custom smelters' quotation.

A talking point has been the possibility of Russia placing an order in the UK for copper wire. Negotiations are understood to be going on with Chile for this purpose, but it is a moot point whether that country can meet the full requirements of the Soviet Union. In any event so long as an order is forthcoming the present overall production/consumption position will benefit—regardless of who obtains it. After several price cuts the Belgian price of copper was raised last week from 23.00 Belgian francs a kilo to 23.25 francs. Against this the market has had to contend with the rumour that February deliveries by brass mills in the US are appreciably down compared with those made in January.

The International Tin Council's communiqué issued towards the end of last week stated that no change would be made in the total permissable exports for either the first or the second control period. The next meeting has been fixed for April 29. Meanwhile the market in London has been firm and the prices of both cash and three months' metal have risen. Evidence that the production restrictions are taking effect are increasing and this is beginning to attract consumer buying both here and on the Continent. US buying is also reported and this has been reflected in the Eastern price, which has risen steeply. In America there has been more activity and the price is above 96 cents a pound.

Lead is reasonably firm in London and the undertone has improved in New York, where the price is called 13 cents a pound. The US Bureau of Mines has released statistics showing that the cutbacks in production are now taking effect, which should aid market sentiment.

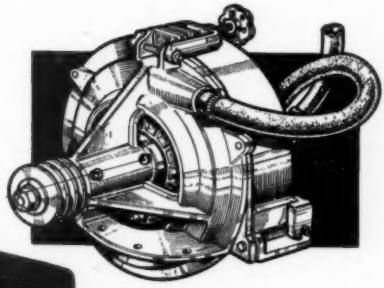
Zinc is an erratic market in London and devoid of feature in New York, where the price is quoted at 10 cents a pound. In February the GSA took 7,000 tons for the stockpile, which represents a reduction on previous monthly purchases.

Latest Foundry Statistics

Light-alloy Castings:—The Ministry of Supply reports that the output of aluminium castings during December 1957 was 1,609 tons from sand moulds, 3,664 tons was gravity-die and 1,512 was pressure-die-castings. The production of magnesium-alloy castings during this month was 184 tons.

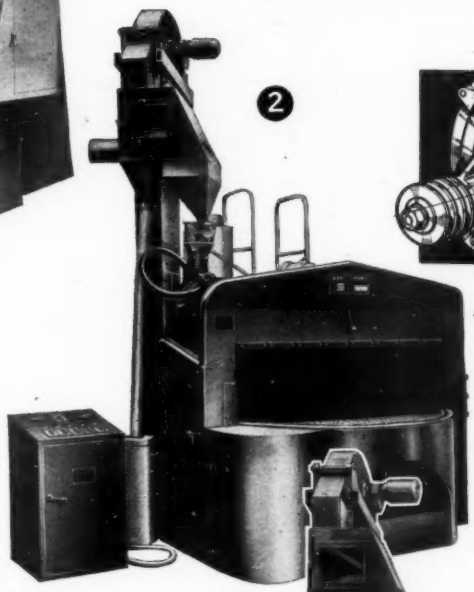
Shot Blast Equipment

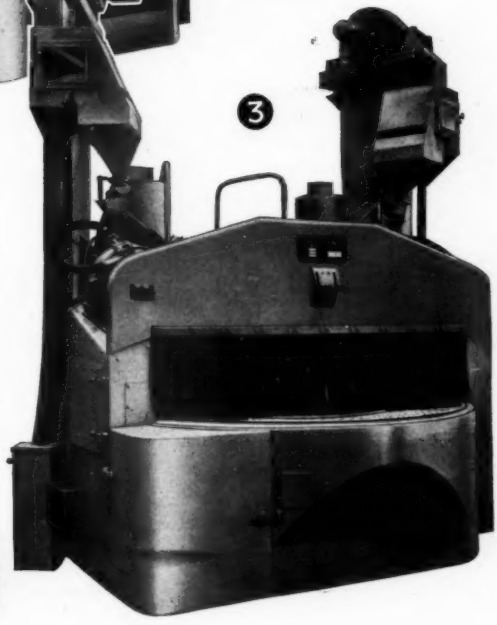
This A-S-L Turbine is the most modern Shot Blasting Unit available. The bi-phase air injection system enables shot to be projected at greater speeds using lower power with fewer replacements. The economies effected in spare parts alone are very substantial.



Baker Perkins High Speed Bi-Phase A-S-L Turbine, British Patent, No. 510681.

These machines do not require pits or special foundations.





1. **ROTARY BARREL**
2. **CADET**
3. **MEDIUM**

Our standard range of Rotating Barrel and Table Shot Blast Machines is capable of handling a wide range of Foundry products. Both types are semi-automatic, the rotating barrels being equipped with skip hoist loading gear and frontal discharge mechanism. These modern highly efficient machines are in use in Foundries all over the world, and are built to the high standards of design, materials and workmanship characteristic of all Baker Perkins' machines.

BAKER PERKINS LIMITED
ENGINEERS
WESTWOOD WORKS · PETERBOROUGH

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

March 12, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £47 10s. 0d. to £50 15s. 0d., scale 16s. 6d. to 17s. 0d. per unit; 75 per cent. Si, £67 0s. 0d. to £76 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 26s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 6d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £93 0s. 0d. to £96 10s. 0d., basis 60 per cent. Cr, scale 32s. 0d. per unit; over 6 per cent. C, £91 0s. 0d., basis 60 per cent. Cr, scale 31s. 0d. to 32s. 0d. per unit; 2 per cent. C,* 2s. 1d. to 2½d. per lb. Cr; 1 per cent. C,* 2s. 1½d. per lb. Cr; 0.15 per cent. C,* 2s. 2½d. per lb. Cr; 0.10 per cent. C,* 2s. 2¾d. per lb. Cr; 0.06 per cent. C,* 2s. 3d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 3d. to 7s. 10½d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent., Nb + Ta, 20s. 9d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £87 19s. 3d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £33 1s. 6d.; tested, 0.08 to 0.33 per cent. C, £34 1s. 6d.; hard (0.41 to 0.60 per cent. C), £35 3s. 0d.; silico-manganese, £44 2s. 6d.; free-cutting, £37 5s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 7s. 0d.; silico-manganese, £44 10s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 18s. 6d.; acid, up to 0.25 per cent. C, £43 10s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 12s. 0d.; boiler plates (N.-E. Coast), £45 2s. 0d.; floor plates (N.-E. Coast), £44 1s. 0d.; angles (N.-E. Coast), £40 6s. 6d.; joists (N.-E. Coast), £40 2s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats, 5 in. wide and under, untested soft basic, 50 tons and over, £40 8s. 0d. (under 10 tons to 4 tons, £41 5s. 6d.; under 4 tons to 2 tons, £41 10s. 6d.); hoop and strip, coils, £40 10s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £45 16s. 0d.; black sheets (hand mill), 24g., £59 4s. 6d.; galvanized corrugated sheets, 24g., £67 6s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £69 9s. 6d.; nickel-chrome, £100 12s. 6d.; nickel-chrome-molybdenum, £112 16s. 6d.

NON-FERROUS METALS

Copper.—Cash, £166 15s. 0d. to £167 0s. 0d.; three months, £169 0s. 0d. to £169 5s. 0d.; settlement, £167 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 7½d. per lb.; rods, 191s. 0d. per cwt. basis; 20 s.w.g., 224s. 3d. per cwt.

Tin.—Cash, £731 10s. 0d. to £732 0s. 0d.; three months, £736 0s. 0d. to £736 10s. 0d.; settlement, £732 0s. 0d.

Lead (Refined Pig).—First half March, £74 12s. 6d. to £74 15s. 0d.; first half June, £74 7s. 6d. to £74 10s. 0d.

Zinc.—First half March, £62 17s. 6d. to £63 2s. 6d.; first half June, £63 5s. 0d. to £63 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £97 0s. 0d.; rolled zinc (boiler plates), all English destinations, £94 15s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £85 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 4½d. per lb.; sheets to 10 w.g., 146s. 0d. per cwt.; wire, 2s. 2½d.; rolled metal, 146s. 0d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £121; B6 (85/15), £162; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £169; HTB2 (38 tons), —; HTB3 (48 tons), £185.

Gunmetal.—BS1400, LG2 (85/5/5/5), £148; LG3 (86/7/5/2), £159; G1 (88/10/2/½), £217; (88/10/2/1), £204.

Phosphor Bronze.—BS1400, PB1 (AID released), £230 per ton.

Phosphor Bronze Strip, etc.—Strip, 219s. 6d. per cwt.; wire, 3s. 4½d. per lb.; rods, 2s. 8¾d.; tubes, 2s. 8¾d.; chill cast bars: solids 2s. 10½d.; cored 2s. 11½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 3¾d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 8½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 7½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £77 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £198; AB2, — .

* Average 68-70 per cent.